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# Westville Lake

Southbridge, Massachusetts

## Master Plan

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**US Army Corps  
of Engineers®**  
New England District

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## **PREFACE**

The recreation opportunities available at Westville Lake offer an important addition to public open space in south central Massachusetts. The project provides needed facilities for recreation activities such as hiking, canoeing, kayaking, fishing, hunting, picnicking, mountain biking and cross-country skiing. Planning of facilities has been coordinated with state and local governmental agencies as well as interested private groups and individuals.

Recreation facility development outlined in this master plan has been based on careful analysis of regional recreation needs balanced against recreation impact and land use suitability. Preservation and improvement of wildlife, fisheries and forest habitat are no less important goals in the development plans outlined in this master plan.

### **Mission Statement:**

The land, water and recreational resources of Westville Lake will be managed to protect, conserve, and sustain natural and cultural resources, especially environmentally sensitive resources, and provide outdoor recreation opportunities that complement project resources for the benefit of present and future generations.

## **Executive Summary**

This master plan covers 1,082 acres of federally owned land and real property interests at Westville Lake. The plan prescribes a land and water management plan, and resource objectives. The master plan provides design and management concepts which provide the best possible combination of responses to the needs of the region, resources capabilities, and interests and desires consistent with the projects authorized flood control purposes. The master plan covers resources such as fish and wildlife, vegetation, soils, cultural, interpretive, recreational and out-granted lands, easements and water.

Inputs to the planning process included surveys and management plans for natural, wetland and cultural resources, and an analysis of recreational use, capacity and projected needs for project lands. Natural and man-made resources were located, identified and analyzed, including wetlands, exemplary natural communities, and cultural resources that require management efforts for their protection. These were integrated into a series of project wide objectives to protect and enhance project resources and promote and develop, as appropriate, those resources for public use, education, and access.

Recreational opportunities were identified through an analysis of regional needs and the public participation process. The planning process identified opportunities for the improvement of existing recreational facilities, enhancement of boat facilities, picnic area and play fields, and multiple resource management actions to enhance and protect important natural and cultural resources. Enhancing and preserving the resources by careful management of potential user conflicts were also identified.

The carrying capacity of the project is constrained by the number and size of the picnic shelters, number of picnic tables and grills, size of the boat launches, number and size of restrooms and limitations on the availability of parking. A review of the recreational level of activity and demand did reveal the need for minimal expansion of the recreational facilities that should be addressed by the Project Manager.

This master plan provides guidance for any future development or planning at Westville Lake. The natural and man-made resources at the project will continue to be managed to provide the best combination of responses to regional and ecosystem needs, project resources and capabilities. During the implementation phase period of the master plan, the New England District will continue to be responsible for the administration and management of the project.

All specific proposals for recreational or other development at the project must comply with this master plan, the flood risk management requirements of the Thames River Basin, the National Environmental Policy Act and other federal requirements.

## Table of Contents

PREFACE .....	i
EXECUTIVE SUMMARY .....	ii
CHAPTER 1 - INTRODUCTION .....	1
1.2 Project Purpose.....	1
1.3 Purpose and Scope of the Master Plan.....	1
1.4 Watershed/Project Description.....	3
1.5 Listing of Prior Design Memorandums .....	4
CHAPTER 2 – PROJECT SETTING AND FACTORS INFLUENCING RESOURCE MANAGEMENT AND DEVELOPMENT .....	6
2.2 Hydrology .....	7
2.3 Sediment and Shoreline Erosion.....	8
2.4 Water Quality .....	8
2.5 Project Access .....	8
2.6 Climate.....	9
2.7 Topography, Geology and Soils .....	9
2.8 Resource Analysis .....	10
2.8.1 Fish and Wildlife Resources .....	11
2.8.2 Vegetative Resources .....	12
2.8.3 Rare, Threatened and Endangered Species.....	12
2.8.4 Invasive Species .....	13
2.8.5 Ecological Settings.....	13
2.9 Cultural Resources.....	14
2.9.1 Prehistoric Resources .....	14
2.9.2 Historic Period.....	15
2.9.3 Archaeological Resources .....	15
2.9.4 Prehistoric Resources .....	15
2.9.5 Historic Resources .....	16



2.10 Demographics .....	16
2.10.1 Population .....	16
Table 2.2 – Population Projections .....	16
2.11 Recreation Facilities, Activities and Needs .....	16
2.11.1 Westville Dam Site .....	17
2.11.2 Westville Lake Recreation Areas .....	17
2.11.3 Future Park Development .....	19
2.11.4 Zones of Influence.....	19
TABLE 2.3 Regional Recreation Facilities within 20 Miles.....	20
2.11.5 Visitation .....	20
TABLE 2.4 – Visitation .....	20
2.11.6 Recreational Analysis .....	20
2.11.7 Recreational Carrying Capacity .....	22
2.12 Real Estate and Land Use Acquisition Policy.....	23
2.13 Pertinent Public Laws.....	24
2.14 USACE Guidance .....	26
CHAPTER 3 - RESOURCE OBJECTIVES .....	27
3.1 General .....	27
3.1.1 Introduction .....	27
3.1.2 Project-Wide Resource Goals.....	28
3.1.3 General Resource Objectives .....	29
3.1.4 Environmental Stewardship Resource Objectives .....	30
3.1.5 Cultural Resource Objectives.....	31
3.1.6 Recreation Resource Objectives.....	32
CHAPTER 4 – LAND ALLOCATION AND CLASSIFICATION .....	33
4.1 Land Allocation .....	33
4.1.1 Operations.....	33
4.1.2 Recreation .....	33
4.1.3 Natural Resource Management.....	33

4.2 Land Classification .....	33
4.2.1 Project Operations.....	33
4.2.2 High Density Recreation.....	33
4.2.3 Environmentally Sensitive Areas .....	33
4.2.4 Multiple Resource Managed Lands .....	34
TABLE 4.1 Land and Water Classification at Westville Dam.....	34
4.3 Project Easement Lands.....	34
4.4 Utility Corridors .....	35
CHAPTER 5 – RESOURCE PLAN.....	35
5.1 Management by Classification .....	35
5.1.1 Project Operations .....	35
5.1.2 High Density Recreation .....	35
5.1.3 Environmentally Sensitive Areas.....	35
5.1.4 Multiple Resource Management Lands.....	35
5.2 Development Needs.....	36
CHAPTER 6 – SPECIAL TOPICS/ISSUES/CONSIDERATIONS .....	37
6.1 Recreation.....	37
6.2 Partnerships and Coordination .....	37
6.3 Encroachments and Trespasses.....	37
CHAPTER 7 – PUBLIC AND AGENCY COORDINATION.....	38
CHAPTER 8 – SUMMARY OF RECOMMENDATIONS.....	38
CHAPTER 9 - BIBLIOGRAPHY/REFERENCES .....	39
APPENDIX A – PROJECT TABLES .....	42
APPENDIX B – NATURAL RESOURCE MAPS.....	48
APPENDIX C – PARK AND RECREATIONAL MAPS .....	54
APPENDIX D – PROJECT MAPS.....	57
APPENDIX E – PUBLIC COMMENTS .....	66

## **CHAPTER 1 - INTRODUCTION**

### **1.1 Project Authorization**

The Westville Lake flood risk management project was authorized by the Flood Control Act of June 22, 1936 (Public Law 738, 74<sup>th</sup> Congress) as amended by the Flood Control Act of June 28, 1938 (Public Law 761, 75<sup>th</sup> Congress) and constructed by the U.S. Army Corps of Engineers (USACE) in 1962 as one unit of a comprehensive plan for flood control in the Thames River Basin.

### **1.2 Project Purpose**

The Westville Lake project in the Thames River Basin provides flood risk management primarily to Southbridge, Massachusetts, and helps protect communities in conjunction with the other projects in the basin to provide protection to the major industrial, residential and community centers further downstream on the Quinebaug and Thames River.

Construction of Westville Dam began in April 1960 and was completed in August 1962 at a cost of \$5,684,683. Through February 2020, the facility has prevented approximately \$54,608,000 in flood damages.

In addition to flood control, the project lands also provide opportunity for public recreation, fish and wildlife and vegetation management, and open space preservation.

### **1.3 Purpose and Scope of the Master Plan**

By definition, master plans for USACE reservoirs are land and recreational use management plans that do not address the technical aspects of water management for flood risk management, navigation, or water supply. This master plan presents an inventory of land resources, land classifications for management, modernization of existing park facilities, an analysis of resource use, anticipated influences on project operation and management, and an evaluation of existing and future needs required to provide a balanced management plan to improve outdoor recreation opportunities and sustain natural resources.

The master plan provides direction for project development and use as well as guidance for appropriate uses, development, enhancement, protection, and conservation of the natural, cultural, and man-made resources at the Westville Lake project. It is a vital tool for the responsible stewardship of project resources for the benefit of present and future generations. A master plan is programmatic and identifies conceptual types and levels of activities, not designs, project sites, or estimated costs. All actions by USACE, the agencies and individuals granted leases to the USACE lands (out-grantees) must be consistent with the master plan. Therefore, it must be kept current in order to provide effective guidance in the USACE decision-making.

The master plan is based on responses to regional and local needs, resource capabilities and suitability and expressed public interests consistent with authorized project purposes and pertinent legislation and regulations. It provides a District-level policy consistent with national objectives and state and regional goals and programs. The plan is distinct from the project-level implementation emphasis of the Operational Management Plan (OMP). Policies in the master plan are guidelines implemented through provisions of the OMP, specific Design Memorandums and the Annual Management Plans. This master plan supersedes the previous Westville Lake Master Plans.

This document presents data on existing conditions, anticipated recreational use, types of facilities needed to service the anticipated use, and an estimate of future requirements. In accordance with Engineering Regulation (ER) 1130-2-550, Change 07, dated Jan. 30, 2013 and Engineering Pamphlet (EP) 1130-2-550 Change 05, dated Jan. 30, 2013, master plans are required for most USACE water resources development projects having a federally owned land base. This revision of the Westville Lake Master Plan is intended to bring the plan up to date to reflect changes in outdoor recreation trends as well as ecological and socio-demographic changes that are currently impacting the lake and those anticipated to occur within the planning period of 2020-2045, a 25-year period. The revised plan focuses on overall goals and objectives and not on details of design, routine management, and administration.

This master plan provides a comprehensive and coordinated guide for the conservation, enhancement, development, management and use of recreation resources of the lands and waters owned by the United States government at Westville Lake. These recreation development plans are intended to maximize public use of project resources, within the constraints of land suitability, recreation demand and flood control operations of the project.

This master plan for the management of natural resources and outdoor recreation has been prepared in accordance with the objectives and policies governing the planning, development, and management of these resources at U.S. Army Corps of Engineers water resources projects. These objectives and policies are outlined in ER 1130-2-540, "Environmental Stewardship Operation and Maintenance Policies"; ER 1130-2-550, "Recreation Operations and Maintenance Policies"; EP 1130-2-550, "Recreation Operations and Maintenance Guidance and Procedures"; ER 1165-2-400, "Recreational Planning, Development, and Management Policies"; and other related or referenced regulations and policies.

ER 1130-2-540 established the following program objectives for management of a project's natural resources.

- Manage natural resources on USACE administered land and water in accordance with ecosystem management principles to insure their continued availability.
- Provide a safe and healthy environment for project visitors.

Utilizing this general guidance, ER 1130-2-550 and EP 1130-2-550 provide the specific policy for preparation of project master plans. Each master plan must cover all resources, including, but not limited to fish and wildlife, vegetation, cultural, aesthetic, interpretive, recreational, mineral, and commercial and out granted lands, easements, and water. Based on EP 1130-2-550, the primary goals of the Westville Lake Master Plan are to prepare a concept document that prescribes an overall land and water management plan, and establishes resource objectives, and associated design and management concepts, which:

- Provide the best combination of responses to regional needs, resource capabilities and suitability, and expressed public desires consistent with authorized project purposes;
- Contribute towards providing a high degree of recreational diversity within the region;
- Emphasize the particular qualities, characteristics and potentials of the project;
- Exhibit consistency and compatibility with national objectives and other state and regional goals and programs.

ER 1130-2-550 further defines these goals as they relate to recreation management and established the following program objectives:

- Provide a quality outdoor recreation experience which includes an accessible, safe and healthy environment for a diverse population;
- Increase the level of self-sufficiency for the USACE recreation program;
- Provide outdoor recreation opportunities on USACE administered land and water on a sustained basis;
- Optimize the use of leveraged resources to maintain and provide quality public experiences at USACE water resources projects.

#### **1.4 Watershed/Project Description**

Westville Dam and Reservoir is located in south-central Massachusetts on the Quinebaug River, approximately 1.3 miles west of the center of the town of Southbridge. The dam site is south of U.S. Route 20, and approximately one mile upstream from the Massachusetts Route 131 Bridge crossing the Quinebaug River in Sturbridge, Massachusetts. The dam and reservoir occupy portions of Southbridge and Sturbridge, Massachusetts and are about 18 miles southwest of Worcester and 25 miles east of Springfield. Refer to Locus Plan in Appendix D – Project Maps.



The main office for Westville Lake is located at 200 Marjorie Lane in Southbridge, Massachusetts.

### **1.5 Listing of Prior Design Memorandums**

Separate Design Memorandums were prepared from 1959 through 1963 setting forth design criteria for all aspects of the project including the prime flood risk management facilities, real estate acquisition, road and utility relocations, reservoir clearing, and the master plan for recreation development and land management.

### **1.6 Listing of Pertinent Project Information**

Westville Dam is a rolled-earth fill structure with rock fill slope protection and downstream toe. The dam is 560 feet long with a maximum height of 72 feet above the riverbed. The top of the dam, which is 25 feet wide at elevation 587.0 mean sea level (MSL) accommodates a paved road. It has an overflow concrete ogee section spillway founded on rock, 200 feet long with crest elevation 572.0 MSL.

The outlet works, located in a central spillway section, consists of three 4'-0" x 6'-0" gated rectangular conduits. Three electrically operated slide gates control flow through the outlet works. The approach channel, excavated in earth and rock, has a 30-foot bottom width. The conduit empties out as the main channel of the Quinebaug River. Downstream channel capacity of the Quinebaug River is 1,600 cubic feet per second (cfs).

**Table 1.1 – Pertinent Project Statistics**

**WESTVILLE DAM**

**DRAINAGE AREA:** 99.5 square miles (Gross) 32.0 square miles (Net)

**FLOOD CONTROL STORAGE**

Capacity: 11,000 acre feet

6.4 (net) inches of runoff

Area at Crest: 913 acres

**PERMANENT POOL:** 23 acre recreation pool; Stage: 10.5 feet; 525.5 feet  
National Geodetic Vertical Datum (NGVD)

**DAM**

Type: Rolled Earth Fill

Length: 560 feet

Top Elevation: 587 feet NGVD (72 feet)

**CONTROL WORKS**

Type: 3 Rectangular Conduits

Size: 4' x 6'

Length: 63 feet

Invert Elevation: 515 feet NGVD

Weir Elevation (top of logs): 10.5 feet (525.5 feet NGVD)

Capacity (Full Pool): 3,750 cfs

Gates (Type): Electric Controlled Slide

Number: 3

Size: 4' X 6'

Channel Capacity: 1,600 cfs

**SPILLWAY**

Type: Chute Spillway w/Concrete Ogee Weir

Length: 200 feet

Elevation: 572 feet NGVD (57 feet)

**TOTAL COST:** \$5,684,683

**PLACED IN OPERATION:** 1962

## **CHAPTER 2 – PROJECT SETTING AND FACTORS INFLUENCING RESOURCE MANAGEMENT AND DEVELOPMENT**

### **2.1 Description of Reservoir**

#### **2.1.1 Reservoir Management General**

A permanent conservation pool at elevation of 525 feet MSL (10-foot stage) creates a lake covering approximately 23 acres with a maximum depth of 16 feet and a mean depth of 4 feet. This pool level is maintained by means of a weir in front of the middle gate. The weir elevation is set at 525 feet MSL with a stop log provision to raise the elevation to 527 feet MSL.

The capacity of the reservoir at spillway crest elevation is 11,100 acre-feet which is equivalent to 6.5 inches of storage from the net drainage area of 32 square miles above Westville Dam. When filled to capacity, the reservoir extends about 5 miles upstream to the village of Fiskdale. The reservoir at spillway crest elevation will inundate an area of 913 acres to a maximum depth of 63 feet.

Westville Dam operates in series with East Brimfield Dam to protect the primary damage center of Southbridge, Massachusetts. It is also operated in conjunction with Buffumville Dam on the Little River, Hodges Village Dam on the French River and West Thompson Dam on the Quinebaug River, for the protection of the major damage center of Putnam, Connecticut and other downstream communities.

The Westville project area contains approximately 1,081 acres. Of that, approximately 578 acres are held in fee. The remaining 503 acres are held under flowage easement.

#### **2.1.2 Operation and Maintenance**

Operation and maintenance of Westville Lake is performed in accordance with the projects Operational Management Plan (OMP) and the Operation Maintenance (O&M) Manual. Some of the duties included are monitoring, inspections, maintenance, testing, reporting and record keeping. These duties make possible the operation and maintenance for the dam, appurtenant structures, buildings, bridges, utilities, roads, electrical and mechanical equipment and tools. Specific plans for related programs are contained in sections of the OMP and include safety, security, visitor assistance, and other activities.

In addition to inspections and reports required by the OMP and O&M Manual, periodic inspections are performed by a team of specialists from the Engineering Division of the New England District, U.S. Army Corps of Engineers every five years.

USACE personnel consists of three Park Rangers and a Project Manager located at East Brimfield Lake who are responsible for operation, maintenance, and management activities. This staff is also responsible for operation of East Brimfield Dam and Conant

Brook Dam. Temporary seasonal rangers assist in operations throughout the year.

## **2.2 Hydrology**

Regulation of Westville Lake is performed and directed by the Reservoir Regulation Section at the New England District Regional Headquarters in Concord, Massachusetts. The Reservoir Regulation Section is the “command center” for all USACE-operated dams in New England. They consistently monitor river levels and weather conditions and direct the operation of the dams during high flows.

There are emergency operating procedures available in the event that the park manager is unable to communicate with the Reservoir Regulation Section by normal or emergency methods. Westville Lake has an Emergency Action Plan (EAP) updated and in place for such emergencies.

Reservoir pool stage levels, tail water levels, and accumulated rainfall measurements are collected locally at the dams using Sutron data collection stations. At the dam there is a United States Geological Survey (USGS) gauging station that is located a short distance downstream to provide continuous records of releases from the project. This data is stored and transmitted to the reservoir regulation team to assist in the regulation of project outflows.

Flood waters are discharged by operating the outlet gates at Westville Lake and releases are coordinated with those from other reservoirs in the Thames River Basin. The release rates from the reservoir are dependent upon river conditions at the downstream damage centers, but in no case would they exceed the safe channel capacities of the Quinebaug River. Reservoir regulation is normally conducted in three phases: phase I involves the initial appraisal of storm and river conditions that leads to regulation of flows; phase II concerns regulation during the event as flood flows crest and move downstream; and phase III includes emptying of the reservoir following recession of flood level flows. Guidance for the control of flow from Westville Lake is summarized in Appendix A, Table 1 – Outflow Guidance for Westville Dam.

On Aug. 1, 2008, restricted regulation procedures were implemented that restricted the reservoir pool level from rising above twenty feet. This action was taken to minimize the risks associated with seepage concerns at Westville Dam until the condition was rectified. This restriction has since been rescinded.

Reservoir area capacity/frequency information and historic reservoir flood water storages are summarized in Appendix A, Table 2 – Area Capacity of Westville Lake and Appendix A, Table 3 – Annual Peak Pool Levels.

## **2.3 Sediment and Shoreline Erosion**

The general elevation range in the vicinity of the reservoir ranges from about 510 MSL in the stream bed at the dam site to about 810 MSL. The general vicinity of the reservoir is

marked by an extended series of ridges and hills cut by the serpentine course of the Quinebaug River and the many small streams flowing into it. There are portions of the watershed that are fairly steep and conducive to runoff.

All recreational areas experience erosion problems to varying degrees. Erosion control efforts have been implemented as needed to protect the recreation facilities, sensitive habitats, or other resources by a combination of efforts such as implementing Best Management Practices (BMPs), and other vegetation plantings and structural solutions.

## **2.4 Water Quality**

During normal flow periods, the Westville Dam impounds a 23-acre conservation pool with a maximum depth of 16 feet and a mean depth of 4 feet.

The Massachusetts Department of Environmental Protection has designated the waters at Westville Lake as class B, indicating they should be suitable for swimming and fishing, among other purposes. Water quality is good in that it generally meets state standards and is usable for intended purposes including recreation, aquatic habitat and aesthetics. One significant problem is mercury contamination of fish; there is a statewide advisory recommending limits on the consumption of freshwater fish caught in Massachusetts: children under age 12 and pregnant and nursing mothers should refrain from eating all species, and the general public should limit consumption to no more than two meals per month.

### Baseline Monitoring

Data and observations show the water quality is generally good and supports most of its intended uses. Mercury contamination of the fish is a concern throughout New England. Water temperatures indicate the project supports a good warm water fishery in the lake.

### Beach Monitoring

There are neither formal nor informal beach areas at Westville Lake, so no beach monitoring is performed.

### Potable Water Monitoring

Westville Lake has town supplied potable water and no USACE water monitoring is performed.

## **2.5 Project Access**

Main access to the project area is provided via Interstates 90 and 84 and Massachusetts Route 131. The entrance to Westville Dam and the administrative area is located on Marjorie Lane, off of South Street in Southbridge, Massachusetts. The park entrance is located on Wallace Road, off of Route 131 in Sturbridge, Massachusetts.



## **2.6 Climate**

The Thames River Basin has a variable climate characterized by frequent but generally short periods of heavy rainfall in the summer and longer periods of less intense precipitation in the winter. The basin climate is influenced by the prevailing westerly wind and the cyclonic storms that move across the country from the west or southwest. The area is also exposed to coastal storms, locally known as "Northeasters" that travel up the Atlantic seaboard. Tropical hurricanes occur less frequently but have historically caused severe flooding in the Thames River Basin and its tributaries, most notably in August 1955 (Hurricanes Connie and Diane).

The mean annual precipitation over the Thames basin is about 44 inches which is distributed rather uniformly throughout the year. High water events can be expected in any season, resulting from early spring rains combined with melting snow, or heavy rains during the summer and fall. About one-third of the precipitation during the winter months is in the form of snow. Annual snowfall averages from 36 to 40 inches in the southern portion near the coast to about 60 inches at northerly inland points.

The average annual temperature of the basin is 49 F. Average monthly temperatures range between 15-33 F in January and 59-81 F in July. The frost-free season is approximately 135 days in length, varying somewhat with location in the basin.

## **2.7 Topography, Geology and Soils**

### **2.7.1 Topography**

The topography of the reservoir area is hilly with moderate relief. Much of the reservoir lies in the steep, narrow valley of the Quinebaug River while upstream the valley is broader, containing areas of seasonally flooded wetlands. Four tributary streams enter the reservoir area: Hamant Brook, Hobbs Brook, Breakneck Brook and Hatchet Brook. Hamant Brook empties into the river from the south west of Interstate 84. Hobbs Brook approaches from the north-east and joins the river between Farquhar Road and Interstate 84. Breakneck Brook approaches from the south-southwest and joins the river at the intersection of River Road and South Street. Hatchet Brook flows from the south-southeast and joins the river at Old South Street. Elevations range from 515 feet NGVD in the stream bed at the dam to 810 feet NGVD on top of Shepard Hill overlooking the reservoir. Refer to Topography Map in Appendix D – Project Maps.

### **2.7.2 Geology**

The project area, which is situated in Worcester County, was subject to glaciation during the Ice Age or Pleistocene Epoch beginning about one million years ago. Glaciation rounded and smoothed the bedrock, hills and ridges of the area, and covered them with a thin layer of till. The principle evidence of the Late Wisconsin glacial period is stratified and unstratified drift. Post-glacial deposits in the project area appear to be similar to those found in other upland sections of the Worcester Plateau. Steeply sloping upland hillsides in and near the area are covered with deposits of stony glacial till, ground moraine, outwash plains, and kame terraces. Broad glacial terrace and outwash deposits make up the valley

floor along much of the Quinebaug River.

### **2.7.3 Soils**

A variety of soils types have been identified in the project area. The following soils predominate at the project:

- Freetown muck. This soil is very deep, poorly drained, and nearly level.
- Decomposed organic material many feet deep lies on top of sandy or loamy material. The water table is at or near the surface most of the year. Permeability is moderate or moderately rapid. Marsh vegetation is common including cattails and rushes.
- Merrimac fine sandy loam, 3%-8% slopes. This soil is deep and somewhat excessively drained on glacial outwash plains, terraces and kames. Permeability is moderately rapid over loose stratified sand and gravel substrata.
- Paxton fine sandy loam, 8%-15% slopes. This soil is deep and well drained on drumlins. It is formed in compact glacial till. Permeability is moderate in the surface and subsoil but very slow in the very firm substratum (hardpan). This soil is very stony or extremely stony.
- Paxton fine sandy loam, 15%-35% slopes. Description is the same as above.
- Udorthents, smoothed. This soil has been disturbed by construction operations. The natural soil layers no longer exist and are no longer a factor in determining land limitations.

The following soils are also found within the project boundaries but to a lesser extent: Chatfield-Hollis-Rock Outcrop Complex, Hinckley sandy loam, Saco very fine sandy loam, Scituate fine sandy loam, Walpole and Scarborough fine sandy loam.

## **2.8 Resource Analysis**

The environmental resources of the Westville Lake project provide important and valuable natural resource and recreational opportunities. The project maintains a wide variety of fish and wildlife resources and provides popular recreational facilities for the surrounding areas. Fish and wildlife management are carried out on project lands. Recreational activities include picnicking, boating, fishing and hiking.

The project area consists of a total of 578 acres owned in fee and 503 acres held in flowage easement. All lands at the project are under the jurisdiction of the U.S. Army Corps of Engineers. Of the 578 acres, 48% (278 acres) are forested, 37% (214 acres) are wetlands, 9% (54 acres) is non-forested, i.e. open fields and abandoned fields and 5% (32 acres) is non-vegetated, i.e. roads and areas covered by project operation structures.

### 2.8.1 Fish and Wildlife

Westville Lake supports a warm water fishery. Fishing pressure is low. Pan fish are abundant. The feeder streams are generally shallow and narrow and contain primarily warm water species. Warm water species likely to be present are:

Northern pike – *Esox lucius*  
Largemouth bass - *Micropterus salmoides*  
Brown bullhead - *Ictalurus nebulosus*  
Yellow bullhead - *Ictalurus natalis*  
Bluegill - *Lepomis macrochirus*  
Pumpkinseed - *Lepomis gibbosus*  
White sucker - *Catostomus commersoni*  
Yellow perch - *Perca flavescens*  
White perch - *Monroe americana*  
Chain pickerel - *Esox niger*  
Black crappie – *Pomoxis nigromaculatus*  
Golden shiner – *Notemigonus crysoleucas*  
Creek chub – *Semotilus atromaculatus*  
Swamp darter – *Etheostoma fusiforme*  
Black nosed dace – *Rhinichthys atratulus*  
Fallfish – *Semotilus corporalis*  
Creek chub sucker – *Erimyzon oblongus*

The Massachusetts Division of Fisheries and Wildlife stocks the Quinebaug River along Old Mashapaug Road within the project boundaries with rainbow and brown trout in April and May. Water level fluctuations periodically occur due to reservoir regulations for flood risk management purposes. These fluctuations can be both beneficial and detrimental to fish species with the extent of the damage depending on many factors including the time of year, the amount of fluctuation and the direction of fluctuation.

The Westville Lake property is comprised of a diversity of natural communities. This community diversity, in part, is responsible for the great diversity of animals which are present on the project. Beaver colonies are scattered throughout the Quinebaug River Watershed. Deer, fox, skunk, fisher, raccoon, bobcat, coyote, turkey, muskrat and river otter are readily found in the vicinity of the project. Migrating waterfowl such as geese and ducks visit seasonally and are being encouraged by current wildlife management programs. Continued habitat assessment and planning will ensure habitat diversity. Wildlife species that may be expected to occur within the project (per Massachusetts Fish and Wildlife) are summarized in Appendix A, Table 4 – Wildlife Species Present in Massachusetts.

### 2.8.2 Vegetative Resources

Approximately 48%, or 278 acres of the 578 acres owned in fee are forested. Much of the forested area is in second growth white pine and white pine-hardwood types. The principle

species include Eastern white pine (*Pinus strobus*), red oak (*Quercus rubra*), white oak (*Quercus alba*), Eastern Hemlock (*Tsuga canadensis*), red maple (*Acer rubrum*) and quaking aspen (*Populus tremuloides*).

The forest cover is in the 60 - 90 year age class and most stands are even aged. The crown closure averages 100% in pole and saw log size stands. Due to the large amount of competing undesirable growing stock and cull trees, acceptable growing stock is low to moderate. The overall quality of the forestry growing stock is fair to medium. Forest cover types are delineated on Forest Classification Plan in Appendix A – Natural Resource Maps.

### **2.8.3 Rare, Threatened and Endangered Species**

In 1997, the Massachusetts Natural Heritage and Endangered Species Program (NHESP) contracted with USACE to identify and locate rare or protected species, critical habitat for rare or protected species, and any outstanding natural communities occurring at Westville Lake. Taxonomic experts from NHESP staff or contractors carried out the inventory.

No species of federally threatened or endangered status were located on the property.

Four state listed rare species of special concern and one listed as threatened were found at Westville Lake during the survey. A wood turtle (*Glypternys insculpta*) was found near Farquhar Road. The triangle floater mussel (*Alasmidonta undulata*) and squawfoot mussel (*Strophitus undulatus*) were located in the Quinebaug River near Old Sturbridge Village. The Hessel's hairstreak butterfly (*Mitoura hesseli*) was found in the Atlantic white cedar vernal pool.

Two watch list plants were found at the downstream toe of the dam: whorled milkwort (*Polygala verticillata*) and the fringed gentian (*Gentianopsis crinita*).

With the decline in regional bat populations, the northern long-eared bat (*Myotis septentrionalis*) has been federally listed as a threatened species under the Endangered Species Act and included on our list of potential species at the project.

Priority habitat is the mapped geographical extent of known habitat for all state-listed rare plants and animals. These areas are shown on the Rare Species Priority Habitat Map in Appendix B – Natural Resource Maps.

### **2.8.4 Invasive Species**

Executive Order 13112 (Invasive Species, Feb. 3, 1999), directs USACE and other federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. Additional guidance include, "Memorandum, HQUSACE, CECW-ZA, 2 JUN 2009, Subject; US Army Corps of Engineers Invasive Species Policy" and "Memorandum,

HQUSACE, CECW-CO, 17 DEC 2009, Subject; Guidance on authorities for project Specific Restoration to Manage the Introduction of Invasive Species.” Westville Lake will adapt management goals, practices and policies used by the National Invasive Species Council (NISC) 2008-2012 National Invasive Species Management Plan and adopt a long-term management plan. The strategic goals include prevention, early detection and rapid response, control and management, restoration, and organizational collaboration.

Dr. Robert Bertin conducted a survey of the vascular plants at Westville Lake in 1997 as part of the Rare Species Survey conducted by the Natural Heritage and Endangered Species Program. In general, past uses of certain parts of the property for residential, industrial and agricultural purposes have resulted in the introduction of a variety of non-native species. These disturbed areas were quite favorable for the establishment of introduced species. Of the alien species identified, the following are the most notable:

- Asian bittersweet – *Celastrus orbiculata*: southwest end of Old Charlton Street
- Coontail – *Ceratophyllum demersum*: Hobbs Brook
- Morrow’s honeysuckle – *Lonicera morrowii*: common at several sites
- Purple loosestrife – *Lythrum salicaria*: along water margins and marshes
- Phragmites – *Phragmites australis*: Cedar swamp and parts of the Hobbs Brook marshes
- Japanese knotweed – *Polygonum cuspidatum*: at the recreation area
- European buckthorn- *Rhamnus frangula*: in the recreation area and west of the river above the dam
- Multiflora rose - *Rosa multiflora*: numerous locations

### **2.8.5 Ecological Settings**

The Westville Lake project is situated on hilly land with moderate relief in south-central Massachusetts, with an elevation range of 515 feet NGVD in the stream bed at the dam to 810 feet NGVD on top of Shepard Hill overlooking the reservoir. The general vicinity of the reservoir is marked by an extended series of ridges and hills cut by the serpentine course of the Quinebaug River and the many small streams flowing into it. Even along the bank of the river there is little flat land and the frequency of sharp slopes and precipitous riverbanks has resulted in narrow winding secondary roads serving much of the area. Much of the forested area is in second growth white pine and white pine-hardwood types.

The Quinebaug River flows through the area in a generally easterly direction. The average slope of the river in the vicinity of the dam site is about 10 feet to the mile.

### **2.8.6 Wetlands**

The U.S. Army Corps of Engineers, New England District, conducted a wetlands delineation of the Westville Lake in 1997. The study was updated in 2007 using 2005 orthophotography from the Massachusetts geographic information system (GIS). The aim of the study was to identify and characterize the surface waters and wetland communities



on the project site. Roughly 40% of the project area (229 acres) is comprised of wetlands. A summary of the wetland types occurring at the project is included in Table 2.1 below.

**Table 2.1 – Wetland Descriptions**

<b>Wetland Description</b>	<b>Acres</b>
Palustrine Open Water	4
Palustrine Emergent Vegetation	52
Palustrine Scrub Shrub Vegetation	40
Palustrine Forested Open Vegetation	22
Riverine Emergent	2
Riverine Open Water	94
<b>TOTAL</b>	<b>214</b>
Intermittent Streams	2.6 linear miles

Wetland mapping for the project is shown on the Wetland Classification Plan in Appendix B – Natural Resource Maps.

## **2.9 Cultural Resources**

### **2.9.1 Prehistoric Period**

Prehistoric settlement and land use patterns are characterized by limited use of upland areas and more intensive use of terraces above navigable streams and rivers for hunting, fishing and foraging. The project area includes both riverine and tributary stream/wetland environmental settings that contain high resource potential. Certain sections of the Westville Lake project have physical attributes that appear very similar to the locations of previously recorded prehistoric sites in the interior uplands of Massachusetts.

One of the primary features of the project area is the predominance of narrow terrace zones bordering open water or wetlands. These terraces represent the kind of physical setting where prehistoric sites are often distributed.

### **2.9.2 Historic Period**

Prior to the acquisition and construction of the project in 1960, the reservoir area was in a rural setting consisting of houses, agricultural fields and buildings, and wooded hillsides of predominately mixed hardwoods with white pine. Potential waterpower sites are numerous. Based on an examination of historic maps, several sites classified as domestic, agrarian, industrial and transportation were known to have been located on the property. In general, historic archaeology in New England has centered on individual sites and structures dating back to the Colonial period (17th and 18th centuries).

### **2.9.3 Archaeological Resources**

In 1987, a Cultural Resource Reconnaissance Survey was conducted by the Public Archaeology Laboratory, Inc. (PAL) under contract to IEP Inc. and the U.S. Army Corps of Engineers. This study included background research to review data on known cultural resources and formulation of a sensitivity ranking for the project area. Field testing of the sensitivity map for prehistoric resources by limited subsurface testing was performed. A project walkover inspection identified historic cultural resources from documented sources. Two sites were identified as possessing prehistoric archaeological sensitivity and 35 historic sites were located. Nine high-sensitivity and 11 medium-sensitivity areas were delineated by the 1988 PAL survey.

An Intensive (Locational) Archaeological Survey of Westville Lake was conducted in 2011 by Hardlines Design Co. which concentrated on the nine high-sensitivity areas delineated by PAL in 1988. The following information is based upon the results of the reconnaissance survey and the subsequent more detailed survey of the upper end of the reservoir conducted in 2011 by Hardlines Design Co.

The stratified zones of high or medium archaeological sensitivity require further investigation. Areas of high and moderate archaeological sensitivity are depicted in the Archaeological Sensitivity Map in Appendix B – Natural Resource Maps. Please note that archaeological site locations are confidential information that is exempt from the Freedom of Information Act requirements and cannot be divulged to the general public.

An accurate evaluation of the potential significance of the two known prehistoric sites cannot be made with the limited information now available. More intensive archaeological investigation would be necessary to assess their potential eligibility for listing on the National Register of Historic Places. Most identified areas of high and moderate archaeological sensitivity are located in areas that are used primarily for passive recreational pursuits such as fishing, hiking, and bird watching.

### **2.9.4 Pre-Historic Resources**

The original reconnaissance survey (PAL 1987) identified and documented two pre-contact period (12,500-3,000 Years Before Present) sites within the project boundary. An additional PAL survey in 1999 identified and documented nine newly discovered pre-contact period sites within the project boundary. Hardlines Design Co. (2011) identified 15 new pre-contact sites.

### **2.9.5 Historic Resources**

The original reconnaissance survey (PAL 1987) documented 35 post-contact period (1620 A.D.- present) sites. An additional PAL survey in 1999 identified and documented six newly discovered pre-contact period sites within the project boundary. The results of the Intensive Survey by Hardlines Design Co. (2011) identified 17 new post-contact period sites. In contrast to the reconnaissance survey performed in 1987 by PAL, the post-contact sites identified represent refuse disposal activities associated with domestic sites,

rather than the mix of industrial and infrastructure-type sites identified in 1987. In addition, the survey results significantly reduce the size of the areas identified as having a high sensitivity for archaeological resources.

## 2.10 Demographics

### 2.10.1 Population

**Table 2.2 – Population Projections**

TOWN	Pop. 2020	Pop. 2025 est.	Pop. 2030 est.	Pop. 2035 est.
BRIMFIELD	4,402	3,813	3,786	3,704
BROOKFIELD	3,796	3,766	3,842	3,860
CHARLTON	16,582	15,741	16,771	17,720
DUDLEY	10,824	13,029	13,417	13,810
E. BROOKFIELD	2,070	2,258	2,241	2,208
HOLLAND	3,223	2,454	2,405	2,326
OXFORD	13,818	13,328	12,902	12,411
SOUTHBRIDGE	17,669	16,328	16,037	15,721
SPENCER	11,897	11,071	10,608	10,034
STURBRIDGE	8,847	10,845	11,332	11,738
WALES	2,288	1,859	1,841	1,812
WARREN	5,640	5,635	5,741	5,808
WEBSTER	18,306	17,206	17,178	17,022
<b>TOTAL:</b>	<b>113,722</b>	<b>117,333</b>	<b>118,101</b>	<b>118,174</b>
SOURCE: UMASS Donahue Institute of Economic & Public Research				

## 2.11 Recreational Facilities, Activities and Needs

The following is an overview of the facilities located at Westville Lake. Recreation facilities are centered on the developed recreation area and around the administration area. A general description of the recreational activities and facilities that are presently offered for public use are described below and as noted on the Recreation Site Plan in Appendix C – Park and Recreation Maps.

### 2.11.1 Westville Dam Site

The flood risk management facility at Westville Lake is operated and maintained by the U.S. Army Corps of Engineers. The specific facilities include the dam structure and control tower, the intake and outlet channels, the spillway and related structures required for the operation of the dam. USACE offers tours of the Westville Dam facility, by appointment, to

learn about the operation of this flood risk management facility. A paved, striped parking lot for seven vehicles is located at the end of the dam access road and serves as a scenic overlook of the dam and reservoir area. Two park host sites are located adjacent to the project office.

### **2.11.2 Westville Lake Recreation Areas**

The recreation area at Westville Lake consists of approximately 31 acres of which 25 acres are developed. The remainder is forested trail areas. The park is open 8 a.m. to 8 p.m. from the second Saturday in May through the second Sunday in September. A volunteer park host campsite is located on the access road to the park. No swimming area is provided at the project.

#### **2.11.2.1 Trails**

The Westville section of the Grand Trunk Trail, a National Recreation Trail, winds along the Quinebaug River on the bed of the defunct Grand Trunk Railroad. A gravel parking lot outside the main gate of the recreation area provides space for 20 vehicles and serves as the trailhead for this section of the Grand Trunk Trail. The Grand Trunk Trail extends north on the west side of the reservoir area approximately  $\frac{3}{4}$  mile to Westville Dam and to the west approximately one mile to River Road. The trail is used by hikers on a year-round basis, by bicyclists in summer, and cross country skiers in winter.

The Heritage Trail starts at the Southbridge West Street School and extends north approximately one mile along the east side of the reservoir area up Old South Street to the Grand Trunk Trail trailhead. The trail is used by hikers and joggers year-round. A bridge across the inlet channel on the upstream side of Westville Dam connects this trail with the Grand Trunk Trail.

Trails are delineated on the Trails Map in Appendix C – Park and Recreation Maps.

#### **2.11.2.2 Athletic Field**

A 4.5-acre field in the park may be reserved for baseball, softball and soccer activities. A paved parking lot adjacent to the field provides parking for 32 vehicles. A drinking fountain is located between the parking lot and the athletic field.

#### **2.11.2.3 Boat Launch**

A paved boat ramp is located within the park on the southwestern side of the recreation pool. A paved, striped, parking lot provides parking for 13 cars and trailers. The use of watercraft including motorboats, canoes, kayaks, rowboats, and other vessels are permitted. All persons using watercraft are required to comply with applicable U.S. Coast Guard, U.S. Army Corps of Engineers and Massachusetts laws and regulations. Personal watercraft, including jet skis, are not allowed.

#### **2.11.2.4 Picnic Area**

A picnic area is located at the end of the access road on the hilltop overlooking the athletic field area. Facilities include two picnic shelters that may be reserved for a nominal fee (the large shelter has 10 picnic tables, two group size grills and electricity and the smaller shelter has five picnic tables, one group size grill and electricity) and a comfort station with flush toilets (each side has one handicapped accessible toilet).

In addition, the following facilities are available in the picnic area: 40 picnic tables, 20 pedestal grills, two drinking water fountains, handicapped accessible portable toilet, public pay telephone, and a paved, striped, parking lot which provides parking for 75 vehicles. Approximately 13 acres of regularly mowed lawns are used for kite-flying, sunbathing, blanket picnicking, snow sledding, games and special events.

#### **2.11.2.5 Old Mashapaug Road**

A one mile long section of Old Mashapaug Road winds along the Quinebaug River from the recreation area entrance west to the limits of government property. A canoe launch located at the end of the road provides access to the upper reaches of the Quinebaug River within the reservoir area. Stream fishing is popular along the entire length of the road.

#### **2.11.2.6 Ice Skating Pond**

Near the recreation area entrance is an area that is flooded in the winter months with approximately six inches of water for use as an ice skating pond. Benches are provided around the edge for visitors.

#### **2.11.2.7 Other Recreational Activities**

Hunting, fishing and trapping are permitted on project lands in accordance with applicable federal and state laws. No hunting is permitted in the Westville Lake Recreation Area or in the immediate vicinity of the dam.

Presently, lake-staff manage recreation areas using historic visitation data combined with best professional judgment to address recreation areas considered to be overcrowded, overused, underused, or well balanced. Project staff will continue to identify possible causes and effects of overcrowding and overuse and apply appropriate best management practices including site management, regulating visitor behavior, and modifying visitor behavior.

### **2.11.3 Future Park Development**

The demand for recreation at Westville Lake is expected to increase over time. This is based on existing and past use of the facility as well as the needs identified in the Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP 2006). For

purposes of recreational planning, the state is divided into seven regions. Westville Lake is located in the Central Massachusetts region. Respondents to surveys in this region identified walking (16.5%), swimming (17%) and hiking (14.4%) as primary desires. Community demands also recommended the development and expansion of trail corridors in Central Massachusetts region to support hiking and cross-country skiing.

Another factor affecting recreational use at Westville Lake is customer satisfaction. Staffed facilities at the project are scenic and well maintained, and park personnel are both visible and available to help and/or advise visitors. Demand for quality facilities that are well maintained and staffed will always be high.

The potential market areas for facilities at Westville Lake were also assessed to determine the population base that is currently served and will be served in the future. The primary market area for the dam and reservoir was assumed to be the area within a 10 mile radius of the facilities. These market areas are shown in Appendix D – Project Maps – Market Area Map. These market areas are consistent with the SCORP 2006 publication, which indicated that visits for fishing, hiking and picnicking can be expected from areas within a 15 to 30 minute commute.

#### **2.11.4 Zones of Influence**

Westville Lake provides numerous opportunities for recreational pursuits. The natural beauty and scenery provided by the project area continues to attract nearby residents and visitors. The developed recreational facilities include a boat launch, picnic area, two picnic shelters, athletic field and many trails. The reservoir area is also open to the public for hiking, biking, cross-country skiing, snowshoeing, canoeing and kayaking, hunting, fishing, and trapping.

##### **2.11.4.1 Regional Recreation Facilities**

In order to assess the future recreation facilities needs at Westville Lake, it is necessary to inventory and compare other recreation facilities available in the region. An inventory of public recreation facilities within 20 miles of Westville Lake was compiled and is summarized on the following page.



**TABLE 2.3**  
**Regional Recreation Facilities within 20 miles of Westville Lake**

Area	Distance (miles)	Boating	Camping	Fishing	Hiking	Hunting	Picnicking	Ski-touring	Snowmobiling	Swimming
<b>FEDERAL</b>										
East Brimfield Lake	5	X		X	X	X	X	X		X
Hodges Village Dam	15				X	X		X	X	
Buffumville Lake	15	X		X	X		X	X	X	X
West Thompson Lake	15	X	X	X	X	X	X	X	X	
<b>STATE</b>										
Douglas State Forest	20	X		X	X	X	X	X		X
Spencer State Forest	15	X		X	X	X	X	X		X
Wells State Park	5	X	X	X	X		X			X
Bigelow Hollow State Park	10	X		X	X	X	X	X	X	

#### 2.11.5 Visitation Profile

The following table summarizes the number of recreational visits at Westville Lake from 2010-2020. Visits are defined as the entry of one person into a recreation area or site to carry on one or more recreational activities. The facilities provided at Westville have been primarily used by local residents and it is considered to be an urban park.

**TABLE 2.4 – VISITATION**

<u>YEAR</u>	<u>VISITORS</u>
2010	66,262
2011	52,210
2012	154,473
2013	189,320
2014	226,540
2015	270,764
2016	138,024
2017	108,981
2018	106,683
2019	106,172
2020	53,677

The majority of the usage of the Westville Lake project area during the recreation season is for hiking, picnicking, outdoor sports and dog walking. From September to April the project experiences a great deal of hiking, hunting and fishing, snowshoeing and cross-country skiing. The recreation facilities allow for many visitors to be able to enjoy the park at one time. The park experiences spikes in visitation on summer weekends and holidays.

#### **2.11.6 Recreation Analysis**

The majority of usage involves picnicking, outdoor sports, hiking and dog walking. Due to the type of facilities available at the project, it is common for the recreation area to approach capacity on summer weekends.

Westville Lake's recreation areas, trails, and water add to the attractiveness, vitality, and appreciation for the outdoors. These areas provide a sense of place and allow a growing population to enjoy outdoor recreation opportunities in an ever growing suburban landscape. While visitation in recreation areas remains strong, there are indications that there is new demand for upgraded facilities and non-traditional recreation opportunities such as disc golf. Recreation has evolved into a modernized and high-tech activity since the construction of Westville Lake's recreation areas. These are examples of unmet recreation demands at Westville Lake. Facilities and recreation demands have become more upscale than the facilities typically found in local parks. There is also an increasing demand for water related recreation activities. These environmental impacts have the potential to make Westville Lake water conditions unsustainable and undesirable for water recreation if not managed properly.





##### **2.11.6.1 Natural and Scenic Qualities**

Westville Lake is situated in a portion of New England known as the Last Green Valley, an area rich in history in a surprisingly rural landscape. This area is still 77% forest and farm, and is the last swath of dark night sky in the coastal sprawl between Boston and Washington DC. It is this quiet, picturesque landscape that has attracted visitors from all over the United States and beyond. In the immediate area of Westville Lake, the occasional storage of floodwaters has had no serious aesthetic effect.

**Table 2.5 – Compatibility Matrix**

Activities	Hunting	Fishing	Hiking	Snowmobiling	Cross Country Skiing	Outdoor Games	Swimming	Picnicking	Canoeing/Kayaking	Snowshoeing	Natural Resource Mgt.
Hunting											
Fishing											
Hiking											
Snowmobiling											
Cross Country Skiing											
Outdoor Games											
Swimming											
Picnicking											
Canoeing/Kayaking											
Snowshoeing											
Natural Resource Mgt.											

Key:

-  - No Conflict
-  - Shared Resource/Potential Conflicts
-  - Possible Conflicts
-  - N/A

### 2.11.7 Recreational Carrying Capacity

The recreational carrying capacity of a lake is the amount of development, use, and activity a lake and associated recreational lands can sustain without being permanently adversely impacted. Visitation estimates for Westville Lake for 2020 amounted to 53,677 visitors as tracked and recorded in the Visitation Estimation and Reporting System (VERS). Presently, lake-staff manage recreation areas using historic visitation data combined with best professional judgment to address recreation areas considered to be overcrowded, overused, underused, or well balanced. Lake-staff will continue to identify possible causes and effects of overcrowding and overuse and apply appropriate best management practices.

The carrying capacity of the various recreational facilities is summarized in the following table.

**Table 2.6 – Carrying Capacity**

Facility Potential:		
Parking	147 spaces @ 2.5 to 4.3 people/ car	
TOTAL =	367 to 632 users	
Maximum Occupancy:		
Picnicking	40 Tables @ 6 people/ table =	240 users
Shelter #1	10 Tables @ 10 people/ table =	100 users
Shelter #2	5 Tables @ 10 people/ table =	50 users
	Total =	390 users

Carrying capacity deficiencies do exist at the Westville Lake Recreation Area. One specific deficiency is the size of the existing restroom which is split in half for men's and women's separate use. The women's side has two toilets and the men's side has two toilets and two urinals. Since future use of the facilities is expected to remain high or increase, continued maintenance and improvement should be practiced to ensure a high quality recreation experience.

## 2.12 Real Estate and Land Use Acquisition Policy

At Westville Lake, land was acquired in fee to elevation 563 feet NGVD and in flowage easement to primarily elevation 577 feet NGVD, but in some cases to 575 NGVD. All lands at Westville Lake were acquired for flood risk management operations at the project. This included areas for permanent structures, construction, borrow, highway relocation and the reservoir. At the present time 578 acres are owned in fee and 503 acres are held in flowage easement. Refer to the Real Estate Map in Appendix D – Project Maps.

There are several easements and land use outgrants associated with the project lands. These easements are summarized in the following table:

**Table 2.7 – Real Estate Agreements**

Westville Lake Real Estate Agreements		
Type of Instrument	Grantee	Contract Number
Easement	TENNESSEE GAS	DACW33-2-84-4
Easement	MOBIL PIPELINE	DACW33-2-70-22
Easement	TOWN OF STURBRIDGE	DACW33-2-97-59
Easement	TOWN OF STURBRIDGE	DACW33-2-74-19
Easement	TOWN OF STURBRIDGE	DACW33-2-82-89
Easement	WORCESTER COUNTY	190-016-C-65-152

Easement	TOWN OF STURBRIDGE	DACW33-2-72-10
Easement	TOWN OF SOUTHBRIDGE	DACW33-2-73-18
Easement	TOWN OF STURBRIDGE	DACW33-2-73-6
Easement	TOWN OF STURBRIDGE	DACW33-2-76-10
Easement	COMMONWEALTH OF MASS.	DACW33-2-76-32
Easement	COMMONWEALTH OF MASS.	DACW33-2-79-18

## 2.13 Pertinent Public Laws

The following laws and regulations provide for the development and management of federal projects:

1. The Historic Sites, Buildings and Antiquities Act of 1935 (16 U.S.C. 461-467), commonly known as the Historic Sites Act, declares a national policy to preserve historic sites and objects of national significance including those located on refuges. It provides for designation, acquisition, administration, and protection of such sites. Additionally, National Historic Landmarks are designated under the authority of this Act.
2. Westville Dam and Reservoir in the Thames River Basin was authorized by the Flood Control Act approved June 22, 1936, Public Law 74-738, as amended by the Flood Control Act approved June 28, 1938, Public Law 75-761.
3. Public Law 78-534 (The Flood Control Act of 1944) as amended by the Flood Control Acts of 1946, 1954, 1960 and 1962, authorizes the U.S. Army Corps of Engineers to construct, operate and maintain public park and recreation facilities at water resource development projects, and permit local interests to construct, operate, and maintain such facilities.
4. Public Law 85-624 (The Fish and Wildlife Coordination Act of 1958) requires that the U.S. Army Corps of Engineers and any agency impounding, diverting, or controlling water, consult with the United States Department of the Interior, Fish and Wildlife Service. The Department of the Interior would evaluate proposed water resources development measures, and determine potential impacts on wildlife resources and measures needed to prevent such impacts.
5. Public Law 86-717 (Forest Cover Act, Sept. 6, 1960) provides a statutory mandate for multiple use forest management, or other vegetative cover management, on project lands and waters.
6. Public Law-72 (The Federal Water Project Recreation Act of 1965), accompanied by House Committee Report No. 254, requires that the U.S. Army Corps of Engineers and other federal agencies give full consideration to fish and wildlife enhancement. It also provides for non-federal participation in land acquisition, and in the development and management of recreational facilities and fish and wildlife resources.

7. Watershed Management Partnership Agreement (Nov. 19, 2004), the U.S. Environmental Protection Agency and the U.S. Army Corps of Engineers signed the Watershed Management Partnership Agreement to promote watershed health, economic sustainability and community vitality through effective management of the nation's watersheds. This partnership builds on existing EPA and USACE efforts and will employ innovative approaches to support watershed restoration, stewardship and management.
8. Public Law-190 (The National Environmental Policy Act of 1969), directs the U.S. Army Corps of Engineers and other federal agencies to prepare environmental impact statements or assessments that describe the environmental effects of proposed projects and measures necessary to minimize any adverse effects.
9. Public Law 91-604 (The Clean Air Act, as amended), specifies that any federal activity, which may result in discharge of air pollutants, comply with federal, state, interstate, and local requirements concerning control and abatement of air pollution.
10. Public Law 03-205 (The Endangered Species Act of 1973, as amended) requires federal agencies to utilize their authorities to carry out programs for conservation of endangered and threatened species protected by the Act.
11. Executive Order 11990 (Protection of Wetlands, May 24, 1977) requires that all federal agencies take action to minimize destruction, loss or degradation of wetlands. It stipulates that federal agencies must avoid providing assistance for new construction located in wetlands unless no practicable alternatives exist, and the proposed action includes measures to minimize harm to wetlands.
12. Executive Order 13112 (Invasive Species, Feb. 3, 1999), directs the U.S. Army Corps of Engineers and other federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasives species cause.
13. Public Law 95-217 (Clean Water Act of 1977, as amended). Section 404 imposes requirements with respect to dredge and fill activities in waterways of the United States, including wetlands. Any fill activities in wetlands must comply with Section 404(b) (1), Guidelines for the Specification of Disposal Sites for Dredge or Fill Material. These guidelines allow fill activities for only the least environmentally damaging practicable alternative.
14. Public Law 96-95 (Archaeological Resources Protection Act of 1979 - RPA). This statute provides protection for archaeological resources by requiring any interested parties to apply for a permit from the controlling federal agency to excavate, or remove any archaeological resource located on public or Indian lands. The Act also provides for civil and criminal penalties for individuals disturbing or looting sites (including military personnel that allow such actions).



15. National Register of Historic Places, Nominations by States and Federal Agencies (36 CFR 60). These regulations govern the process whereby state and federal agencies nominate specific resources under their control to the National Register of Historic Places. This is the country's basic inventory of historic resources and it is maintained by the Secretary of the Interior. This inventory includes buildings, structures, objects, sites, districts, and archaeological resources that may be significant at the national, state or local level.
16. Advisory Council on Historic Preservation, Protection of Historic Properties (36 CFR 800). These are the implementing regulations which govern the Section 106 review process established by the National Historic Preservation Act of 1966, as amended for federal agencies. These regulations implement procedures for assessing the effects of federally approved, assisted, or funded undertakings on properties which are, or may be eligible for listing on the National Register of Historic Places.
17. Public Law 89-72, Federal Water Project Recreation Act of 1965. This act requires that not less than one-half the separable costs of developing recreational facilities and all operation and maintenance costs at federal reservoir projects shall be borne by a non-federal public body. An Office of Congressional Ethics/Office of Management Budget implementation policy made these provisions applicable to projects completed prior to 1965.
18. Public Law 89-90, Water Resources Planning Act (1965). This act established the Water Resources Council and gives it the responsibility to encourage the development, conservation, and use of the nation's water and related land resources on a coordinated and comprehensive basis.

## **2.14 U.S. Army Corps of Engineers Guidance**

The master plan has been prepared in accordance with guidance contained in the following USACE regulations, pamphlets, and manual:

1. ER 1130-2-500 Project Operations, Partners and Support, Work Management Policies
2. ER 1130-2-540 Environmental Stewardship, Operations and Maintenance Policies
3. ER 1130-2-550 Recreation, Operations and Maintenance Policies
4. ER 1165-2-400 Recreation Planning, Development and Management Policies
5. EP 1130-2-500 Project Operations, Partners and Support, Work Management Guidance and Procedures

- |                  |   |
|------------------|---|
| 6. EP 1130-2-540 | Environmental Stewardship, Operations and Maintenance Guidance and Procedures |
| 7. EP 1130-2-550 | Recreation, Operations and Maintenance Guidance and Procedures                |
| 8. EM 1110-1-400 | Recreation Planning and Design Criteria                                       |

## **CHAPTER 3 - RESOURCE OBJECTIVES**

### **3.1 General Resource Objectives**

#### **3.1.1 Introduction**

The purpose of a USACE Master Plan is to establish the guidelines for sustainable stewardship of natural, recreational, and cultural resources managed directly and indirectly on USACE fee lands. Resource considerations at Westville Lake exist primarily due to user demands on the project. Multiple user types have interests in the project lands, recreation facilities, and waters. Such demands occasionally create conflicts. USACE is obligated to manage these resources for the overall interest of the public and not for a select group of individuals.

Providing an environmentally sound balance of these demands is the responsibility of the project and the agency. Impacts on the environment will be assessed during the decision-making process prior to any change to management plans or strategies.

The USACE vision for the future management of the land, water and recreational resources of Westville Lake will be managed to protect, conserve, and sustain natural and cultural resources, especially environmentally sensitive resources, and provide quality outdoor recreation opportunities that complement project resources for the benefit of present and future generations.

This chapter sets forth goals and objectives necessary to achieve the USACE vision for the future of Westville Lake. The terms “goals” and “objectives” are often defined as synonymous, but in the context of this plan, goals express the overall desired end state of the cumulative land and recreation management programs at Westville Lake. Resource objectives specify task-oriented actions necessary to achieve the master plan goals. The purpose of this section is to establish resource objectives for the Westville Lake project. Resource objectives are developed to guide future design, development and management of the resource base, natural and man-made, to obtain the greatest possible benefit through meeting the needs of the public and protecting and enhancing environmental quality and ensuring sustained use.

These objectives are consistent with authorized project purposes, applicable federal laws and directives, regional needs, resource capabilities and expressed public desires.

The overall mission is to provide high quality and responsive management of Westville Lake's natural and man-made resources, while maintaining efficient and effective flood risk management operations to fulfill the projects authorized flood risk management purpose.

### **3.1.2 Project-Wide Resource Goals**

The following goals are the priorities for consideration when determining management objectives and development activities:

- Manage existing natural resources and recreation facilities in compliance with all pertinent laws, regulations, and policies.
- Protect and preserve existing native wildlife species and improve wildlife habitat currently and in the future.
- Protect and preserve existing government boundary line from encroachment, trespass, and private exclusive use through boundary line surveillance and communication with adjacent landowners.
- Protect and preserve existing government property from erosion and overuse through natural resource management.
- Inform the public through programs and personal contacts about the project and resource management purposes and objectives.
- Integrate fish and wildlife management practices with other natural resource management practices while working closely with state and local natural resource agencies.
- Identify safety hazards or unsafe conditions; correct infractions and implement safety standards in accordance with EM 385-1-1.
- Develop and manage the project lands and water for maximum enjoyment of the recreating public.
- Increase value of all project lands and waters for recreation, fisheries, and wildlife.
- Encourage non-consumptive use of project lands.
- Practice professional environmental stewardship of the USACE lands and waters consistent with the primary mission of flood risk management.
- Identify and protect environmentally sensitive species, habitats, and landscapes.
- Identify and protect important cultural resources.
- Improve water quality in the lake and waterways.
- Identify outdoor recreation needs and provide those that complement the natural resources.
- Manage public use areas to provide safe and enjoyable opportunities.
- Collaborate with community leaders.
- Maintain open communication with the public at large.
- Create partnerships to leverage fiscal resources.

Implementation of these goals is based upon time, manpower, and budget. The objectives provided in this chapter are established to provide high levels of stewardship to USACE managed lands and resources while still providing a high level of public service. These

goals will be pursued through the use of a variety of mechanisms such as assistance from volunteer efforts, hired labor, contract labor, permit conditions, remediation, and special lease conditions.

### **3.1.3 General Resource Objectives**

The project-wide resource management objectives involve the long-term development and management goals of project resources to guide proposed future actions for the public benefit, consistent with resource capabilities within the framework of the USACE Environmental Operation Principles.

- Strive to achieve environmental sustainability. An environment maintained in a healthy, diverse and sustainable condition is necessary to support life.
- Recognize the interdependence of life and the physical environment. Proactively consider environmental consequences of USACE programs and act accordingly in all appropriate circumstances.
- Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.
- Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that impact human health and welfare and the continued viability of natural systems.
- Seek ways and means to assess and mitigate cumulative impacts to the environment; bring systems approaches to the full life cycle of our processes and work.
- Build and share an integrated scientific, economic and social knowledge base that supports a greater understanding of the environment and impacts of our work.
- Respect the views of individuals and groups interested in USACE activities; listen to them actively and learn from their perspective in the search to find innovative win-win solutions to the nation's problems that also protect and enhance the environment.

Resource objectives are attainable actions for development, conservation, and management of natural, cultural, and manmade resources at a project. They are guidelines for obtaining maximum public benefits while minimizing adverse impacts to the environment and are developed in accordance with: 1) authorized project purposes, 2) applicable laws and regulations, 3) resource capabilities and suitability, 4) regional needs, 5) other governmental plans and programs, and 6) expressed public desires.

Resource objectives are defined as clearly written statements that respond to identified issues and that specify measurable and attainable activities for resource development and/or management of the lands and waters under USACE jurisdiction. The objectives stated in this master plan support the plan's goals, USACE environmental operating principles, and applicable national performance measures.

They are consistent with authorized project purposes, federal laws and directives, regional

needs, resource capabilities, and they take public input into consideration. Recreational and natural resources carrying capacities are also addressed in the Resource Objectives.

The objectives in this plan are intended to provide project benefits, meet public needs, and foster environmental sustainability for Westville Lake to the greatest extent possible. They include recreational objectives; natural resource management objectives; visitor information; education and outreach objectives; general management objectives; and cultural management objectives.

### **3.1.4 Environmental Stewardship Resource Objectives**

The following are a series of environmental stewardship goals and objectives:

- Provide for the management of all natural resources associated with the project to include the protection and preservation of rare, threatened and endangered species, the harvesting of forest products, the protection of water quality, and the implementation of programs to manage invasive, non-native species.
- Maintain the health and biodiversity of the forest ecosystem. Provide a range of species, age classes, and structural diversity intended to enhance and maintain the biological diversity of species, communities, and ecosystems.
- Manage high value, commercial timber species favoring well-formed trees, healthy trees with large crowns with minimal competition between timber crop trees.
- Designate active management areas open to sustainable harvesting of wood products to provide young forest habitat and to enhance structural habitat attributes (e.g., snags, den trees, mast-producing trees, coarse woody debris) and passive management areas to include forest reserves that will typically be closed to commercial timber harvesting in order to provide biologically mature forest habitat (generally >150 years old). Forest reserves where commercial harvesting of wood products is excluded will capture elements of biodiversity that can be missing from sustainably harvested sites. Small (patch) reserves will conserve sensitive, localized resources such as steep slopes, fragile soils, wet soils and habitat for certain rare species that benefit from intact forest canopies.
- Enhance and protect fish and wildlife habitat for indigenous species through the use of various woodland, wetlands, and open land management activities.
- Care will be taken to maintain the structural components of the forest (live trees, snags, woody debris, shrubs, and ground cover) that are needed by wildlife.
- Protect and conserve wetlands, rare plant and animal habitats such as vernal pools.
- Wetlands are highly productive sites for a variety of ecological functions, as well as for the enhancement of water quality. All forest management operations in or adjacent to wetlands will be planned and conducted in a manner that protects these functions. Forest management activities in wetlands will take place on frozen ground during the winter to minimize rutting.

- Conservation management practices will be followed on lands that contain Priority Habitat or Estimated Habitat as determined by the Massachusetts Natural Heritage and Endangered Species Program.
- Promote the public's use of the project for both consumptive (i.e. hunting) and non-consumptive (i.e. bird watching) uses.
- Continue to develop our partnership with state and local wildlife officials for the enhancement of wildlife and other natural resources.

#### **3.1.4.1 River Flow**

Perform a comprehensive study on the potential removal of the Box Factory Dam spillway and the removal of the permanent conservation pool to achieve the following goals:

- Return of river environment to original, pre-flood condition with increased river/forest and river/field transition habitats.
- Increase the lotic habitat for species of special concern such as freshwater mussels and provide for ideal stream conditions for native and stocked fish species.
- Increase oxygen levels in river water above and below the dam to support native fish population.
- Decrease temperature of river water above and below the dam for benefit of native aquatic species.

#### **3.1.5 Cultural Resource Objectives**

- Protect known and documented prehistoric and historical archaeological sites.
- Monitor the project area for evidence of unauthorized excavation or collection of cultural resources and damage to sites. Known sites will be maintained and preserved as important project resources.
- Archaeological site and sensitivity maps available at the project office will be examined and if necessary, the USACE archaeologist will be consulted, prior to any development or disturbance on USACE property.
- Interpretive programs for historic and archaeological resources, where appropriate and in accordance with federal laws and directives, will be instituted.
- Document the existing Litchfield Shuttle Mill foundation before its condition deteriorates to the point of requiring removal. Preserve salvageable historic shuttle mill dam metal work for future educational initiatives.

#### **3.1.6 Recreation Resource Objectives**

- Maintain the facilities in the recreation areas to ensure high quality recreation



experiences, barrier free access, and public health and safety.

- Meet the demand for special group use of the picnic area by the addition of a third picnic shelter. Study for potential for a fourth picnic shelter to be located near Second Bridge on Old Mashapaug Road.
- Provide benches, tables, and accessible fishing platforms on the Quinebaug River along former Old South Street, which is a popular fishing area.
- Identify and evaluate the development of potential recreation sites to afford the public a diversity of recreational opportunities and enhance public use of project lands with input from the local community.
- Continue to develop existing partnerships with local organizations to enhance the recreational opportunities available at the project. Continue to work with The Last Green Valley organization to promote recreational use and events at the project as part of the available public lands and resources of the Quinebaug River valley.
- Enhance the Americans with Disabilities Act “ADA” universal accessibility for park features such as water access for wheel chairs, ADA accessible fishing platforms, improved hand rails, more ADA picnic tables, ADA accessible restrooms, increase handicap parking as needed, interpretive signs in Braille, interpretive computer kiosks and other visual aids for the deaf.
- Support the state fish and wildlife stocking programs for the use of project lands for hunting and fishing activities.
- Identify and develop trails through project lands to meet regional and local needs for formally designated recreational trails and provide the public with opportunities to view unique natural areas.
- Maintain the existing visitor assistance program including interpretation to enhance the public's understanding and appreciation of the role of the U.S. Army Corps of Engineers in development and administration of Westville Lake.

## **CHAPTER 4 – LAND ALLOCATION, LAND CLASSIFICATION, WATER SURFACE, AND PROJECT EASEMENT LANDS**

### **4.1 Land Allocation**

Land allocation is identified as the congressionally authorized purpose for which the project lands were purchased. There are three categories of allocation identified as operations, recreation, and natural resource management. The following land use allocation categories are based on those given in Engineering Regulation 1120-2-400.

#### **4.1.1 Operations**

There were 578 total acres acquired in fee for construction of the Westville Lake project. The area designated for operations totals approximately 32 acres.

#### **4.1.2 Recreation**

There were no separable lands acquired specifically for the purpose of recreational development at Westville Lake. Portions of acquired lands were ultimately classified for recreational purposes as described in Section 4.2 below.

#### **4.1.3 Natural Resource Management**

There were no separable lands acquired specifically for the purpose of natural resource management. Portions of lands acquired for project construction and operation were ultimately classified for this purpose as described in Section 4.2 below.

### **4.2 Land Classification**

Land classification indicates the primary use for which project lands are managed. There are four land classifications identified as: project operations, high density recreation, environmentally sensitive areas, and multiple resource managed lands. Maps showing the various land classifications for Westville Lake can be found in the Land Classification Plan in Appendix D – Project Maps. Additionally, there are various existing utility corridors on fee and easement property at Westville Lake. A map of existing utility corridor locations is located in Appendix D – Project Maps.

#### **4.2.1 Project Operations**

This classification includes the lands managed for the dam, spillway, project office, and maintenance yards. There are 32 acres being used specifically for these features.

#### **4.2.2 High Density Recreation**

This classification includes lands developed for intensive recreational activities for the visiting public including day use areas. There are 25 acres of land classified for high density recreation.

#### **4.2.3 Environmentally Sensitive Area**

This classification is for areas where scientific, ecological, cultural, and aesthetic features have been identified. This designation limits and can prohibit further development within the area. There are 249 acres classified as environmentally sensitive areas. These environmentally sensitive designated areas are based on data from the Massachusetts Natural Heritage and Endangered Species Program (NHESP). The environmentally sensitive areas include NHESP Core Habitat for Species of Special Concern and Estimated Habitats of Rare Species. Core Habitat identifies specific areas necessary to ensure the long-term persistence of Species of Conservation Concern (those species listed under the Massachusetts Endangered Species Act as well as additional species identified in the State Wildlife Action Plan), exemplary natural communities, and intact ecosystems. The Priority Habitat Map in Appendix B shows both the NHESP Priority Habitat of Rare Species and Habitat for Species of Special Concern.

#### 4.2.4 Multiple Resource Managed Lands

This classification is for the predominant use of low density recreation, wildlife or vegetation management, and future/inactive recreation with the understanding that other compatible uses can occur within the area. This classification is divided into three sub-classifications identified as: Low Density Recreation, Natural Resource Management, and Future/Inactive Recreation Areas. There are 266 acres of lands that are under this classification. The following describes each sub-classification:

- **Low Density Recreation.** These are lands with minimal development or infrastructure that support passive public use (e.g., fishing, hunting, wildlife viewing, shoreline use, hiking, etc.). They were lands purchased for flood damage reduction operations and classified for low density recreation. The intention of these classified lands is to assure available lands for low density recreation between areas classified as intensive recreational use and wildlife management.
- **Natural Resource Management.** These lands are designated for the management and stewardship of fish, wildlife, and vegetation resources.
- **Future or Inactive Recreation.** These are lands with site characteristics compatible with potential future recreation development or recreation areas that are closed or open but no longer maintained. These areas will be managed as multiple resource land until an opportunity to develop or reopen these areas. There are no acres under this classification at Westville Lake.

**Table 4.1 – Land and Water Classification at Westville Lake**

Land & Water Classification	Acres
Project Operation	32
Recreation	31
Environmentally Sensitive Areas	249
Multiple Resource Managed Lands	266
Low Density Recreation	*
Natural Resource Management	*
Future or Inactive Recreation	0
Open Water (Included in acreages above)	94
<b>TOTAL</b>	<b>578</b>

\*Shared Resources

#### 4.3 Project Easement Lands

These are lands on which easement interests are held, but not fee title ownership.

#### **4.3.1 Flowage Easement**

These are easements purchased by the U.S. Army Corps of Engineers giving the right to temporarily flood private land during flood risk management operations. There are 503 acres of flowage easement lands located at Westville Lake.

#### **4.4 Utility Corridors**

There are three separate Real Estate Easements granted to utility companies at Westville Lake. A map of existing utility corridor locations is located in Appendix D – Project Maps. A summary of the easements is listed below:

- Massachusetts Electric Co. has an easement for a right of way for electric poles on approximately 2 acres.
- Mobil Pipeline Co. has an easement for a right of way for an electric cathodic protection unit on approximately 2 acres.
- Tennessee Gas Pipeline has an easement for a right of way for an underground gas pipeline on approximately 1 acre.

### **CHAPTER 5 – RESOURCE PLAN**

#### **5.1 Management by Classification**

This chapter describes the management plans for each area of classification within the master plan. The classifications which exist at Westville Lake are Project Operations, High Density Recreation and Multiple Resource Management Lands: Low Density Recreation and Natural Resource Management. The management plans identified are in broad terms of how these project lands will be managed. A more descriptive plan for managing these areas can be found in the Westville Lake Operations Management Plan (OMP).

##### **5.1.1 Project Operations**

This land is classified for security reasons pertaining to project operations. This is land associated with the dam, spillway, lake office, maintenance facilities and other areas solely for the operation of the project. The management plan for this 32 acre area is to continue providing physical security necessary to ensure continued operations of the dam and related facilities. This means that public access must be restricted in hazardous locations near the dam and spillway. The goal for these classified lands is to continue operating as done historically in order to ensure project operations.

##### **5.1.2 High Density Recreation**

Westville Lake has 25 acres classified as High Density Recreation. These are lands developed for intensive recreational activities for the visiting public. These areas include the Westville Lake Recreation Area and the areas along Old Mashapaug Road. These specific areas include the boat launch, picnic area, two picnic shelters, and athletic field.

### **5.1.3 Environmental Sensitive Areas**

These are areas where scientific, archaeological, ecological, cultural or aesthetic features have been identified. Designation of these lands is not limited to just lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act or applicable state statutes. These areas must be considered by management to ensure they are not adversely impacted. Typically, limited or no development of public use is allowed on these lands. These areas are typically distinct parcels located within another, and perhaps larger, land classification area. Due to the presence of exemplary natural communities and rare species priority habitat, there are 249 acres of land at Westville Lake designated under this classification.

### **5.1.4 Multiple Resource Management Lands**

Multiple Resource Management Lands are organized into three sub-classifications. These sub-classifications are: Low Density Recreation, Natural Resource Management, and Future/Inactive Recreation Areas. There is a total of 266 acres designated at multiple resource management lands. The following is a description of each sub-classification's resource objectives, acreages, and description of use:

- Low Density Recreation. These are lands with minimal development or infrastructure that support passive public use.
- Natural Resource Management. These are lands designated for the stewardship of fish, wildlife and vegetative resources.
- Future/Inactive Recreation Areas. These are areas with site characteristics compatible with potential future recreational development. There are no lands classified under this sub-classification at Westville Lake.

## **5.2 Development Needs**

This master plan provides guidance for future development at Westville Lake. The natural and man-made resources at the project will continue to be managed by the New England District to provide the best combination of responses to regional and ecosystem needs, project resource capabilities and sustainability, and public desires consistent with the project's authorized flood risk management purpose.

Natural and man-made resources have been identified and analyzed. Recreational opportunities were identified through an analysis of regional needs and expressed public desires.

The master plan has identified opportunities for the improvement of existing recreation facilities, enhancement of boat ramps, vista improvement, and establishment of interpretive trails.

All specific proposals for recreational or other development at the project must comply with this master plan, flood risk management requirements of the Thames River Basin, the

National Environmental Policy Act and other federal requirements.

## **CHAPTER 6 – SPECIAL TOPICS/ISSUES/CONSIDERATIONS**

To the extent possible within the constraints of the primary mission of flood risk management, USACE will endeavor to balance the needs of all user groups.

### **6.1 Recreation**

Westville Lake strives to provide high quality recreational opportunities while balancing all pursuits with natural and cultural resources:

- Upgrade existing trails for compliance, and research options for potential expansions.
- Continue to evaluate the carrying capacity of the recreation areas.
- Adequately address any shoreline erosion and storm water runoff.
- Maintain and upgrade existing infrastructure.
- Continue to correct impacts associated with invasive species.
- Continue with threatened and endangered species research and habitat creation.

### **6.2 Partnerships and Coordination**

To sustain healthy and productive public lands and waters with the most efficient approach requires that individuals and organizations recognize their unique ability to contribute to commonly held goals.

- The Interpretive Services and Outreach Program (ISOP) – moving forward, USACE understands that new technologies must be embraced to connect and communicate with the public to meet their needs.
- Continue to pursue volunteer and partnership opportunities that allow USACE to effectively manage recreation and environmental resources. Volunteer initiatives include tasks such as cleaning lands and waterways, restoring fish and wildlife habitat, and maintaining park trails and facilities.

### **6.3 Encroachments & Trespasses**

Project personnel shall inspect boundaries at intervals sufficient to ensure that boundary lines remain adequately marked and monuments are bound. At a minimum, boundary lines should be inspected every two years. Inspectors shall identify and document unauthorized uses of project lands and encroachments/trespasses. Encroachment and trespasses will be handled by the project staff via written and verbal communications as well as site visits with abutting landowners.



## **CHAPTER 7 – PUBLIC AND AGENCY COORDINATION**

The objectives for a master plan revision were to update the project master plan to comply with new agency requirements for master plan documents in accordance with ER 1130-2-550, Change 7, Jan. 30, 2013 and EP 1130-2-550, Change 5, Jan. 30, 2013.

Coordination with the general public is important in identifying resources and determining public needs. This master plan is a supplement to the full revision completed in 2011, thus electronic and/or printed copies of the draft document will be provided to local constituents and partner organizations for review and comment in lieu of a full public meeting. A 30-day public comment period will take place.

## **CHAPTER 8 – SUMMARY OF RECOMMENDATIONS**

It is recommended that the Westville Lake Master Plan be approved as a guide to the orderly use and development of natural and man-made resources at the Westville Lake flood control project. Approval of this master plan supersedes the previous Westville Lake Master Plans.

This master plan provides guidance for future development at Westville Lake. The natural and man-made resources at the project will continue to be managed by the New England District to provide the best combination of responses to regional and ecosystem needs, project resource capabilities and sustainability, and public desires consistent with the project's authorized flood risk management purpose.

Natural and man-made resources have been identified and analyzed. This included wetlands, forest resources, threatened and endangered species, and cultural resources which require specific management efforts for their protection. Recreational opportunities were identified through an analysis of regional needs and expressed public desires.

Through land use classification, the master plan has designated areas for project operations, recreation, environmental protection, and multiple resource management.

All specific proposals for recreational or other development at the project must comply with this master plan, flood risk management requirements of the Thames River Basin, and the National Environmental Policy Act and other federal requirements.

This master plan conceptually establishes and guides the orderly development, administration, maintenance, preservation, enhancement and management of all natural, cultural, and recreational resources at Westville Lake. The master plan is a land use management document and does not address water management operations, or associated prime facilities (dam, spillway etc.) as those operations are outlined in separate documents. This master plan is stewardship-driven and seeks to balance recreational development and use with protection and conservation of natural and cultural resources.

## **CHAPTER 9 - BIBLIOGRAPHY**

The revised master plan has been prepared in accordance with the following guidance:

- USACE, Design Memorandum (DM), Master Plan for Recreation Resource Development, New England District, December 1963.
- Engineer Regulation (ER) 200-2-2, Environmental Quality - Procedures for Implementing the National Environmental Policy Act, March 4, 1988.
- USACE, Operational Management Plan (OMP), New England District, February 1974, (with changes September 1994).
- Engineer Pamphlet (EP) 1130-2-550, Project Operations - Recreation Operations and Maintenance Guidance and Procedures, Nov. 15, 1996.
- Engineer Regulation (ER) 1130-2-550, Project Operations - Recreation Operations and Maintenance Guidance and Procedures, Nov. 15, 1996 (with changes Oct. 1, 1999, March 1, 2002, Aug. 15, 2002, Aug. 30, 2008, March 30, 2009, Jan. 30, 2013, and Sept. 30, 2013).
- USACE, Historic Properties Management Plan, New England District, 2000.
- Engineer Regulation (ER) 1 105-2-100, Planning Guidance, April 22, 2000.
- Engineer Regulation (ER) 200-1-5, Environmental Quality - Policy for Implementation and Integrated Application of the USACE Environmental Operating Principles and Doctrine, Oct. 30, 2003.
- Engineer Manual (EM) 1110-1-400, Engineering and Design - Recreation Facility and Customer Service Standards, Nov. 1, 2004.
- Engineer Regulation (ER) 200-2-3, Environmental Compliance Policies - Policy for the management of environmental compliance-related operations and maintenance (O&M) activities for the U.S. Army Corps of Engineers (USACE), Oct. 29, 2010.
- Engineer Regulation (ER) 1130-2-540, Project Operations – Environmental Stewardship Operations and Maintenance Policies, November 1996.
- Engineer Pamphlet (EP) 1130-2-540, Project Operations - Environmental Stewardship and Maintenance Guidance and Procedures, Nov. 15, 1996.
- Engineer Regulation (ER) 200-2-3, Environmental Compliance Policies - Policy for the management of environmental compliance-related operations and maintenance (O&M) activities for the U.S. Army Corps of Engineers (USACE), Oct. 2, 2010.

- Engineer Regulation (ER) 1165-2-400, Water Resources Policies and Authorities - Recreational Planning, Development, and Management Policies, Aug. 9, 1985.
- Engineer Pamphlet (EP) 1130-2-500, Project Operations - Partners and Support, Work Management Guidance and Procedures, Dec 27, 1996.
- USACE, Thames River Basin - Master Water Control Manual, New England District, October 2001.
- USACE, Environmental Assessment of the Operation and Maintenance of Westville Lake, New England District, February 1974.
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- USACE, Westville Lake Wetlands Delineation, New England District, 1997.
- USACE, Forest Management Plan for Westville Lake, New England District, 1980.
- Archaeological Reconnaissance Survey of Westville Dam and Reservoir In South Bridge and Sturbridge, Massachusetts, prepared by The Public Archaeology Laboratory, Inc., 1988.
- Intensive (Locational) Archaeological Survey of Westville Lake, prepared by Hardlines Design Company, December 2011.
- Westville Lake Property Rare or Protected Species and Priority Natural Communities Survey, Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, 1998.
- Massachusetts Outdoors, Statewide Comprehensive Outdoor Recreation Plan, Massachusetts Division of Conservation Services, 2006.

#### Prior Pertinent Reports

The following design memoranda, prepared by the New England District, U.S. Army Corps of Engineers, provided basic data concerning the project.

<u>Memorandum No.</u>	<u>Title</u>	<u>Date</u>
1	Hydrology & Hydraulics	April 1959
2	General Design	August 1959

3	Real Estate	August 1959
4	Site Geology	August 1959
5	Embankments & Foundations	September 1959
6	Design of Structural Concrete, Mechanical, Electrical and Misc. Features	August 1959
7	Concrete Materials	July 1959
8	Relocations	August 1959
9	Reservoir Management	June 1963

## APPENDIX A – PROJECT TABLES

**TABLE 1 – OUTFLOW GUIDANCE FOR WESTVILLE DAM**

OUTFLOW GUIDANCE for WESTVILLE DAM QUINEBAUG RIVER, MASSACHUSETTS							
Revised April 1, 2014		Maximum Outflow (cfs)	Minimum Outflow and Aquatic Base Flow (ABF) (cfs)			Maximum change in Outflow (cfs/hr)	
			Oct. – Feb. ABF=100 cfs	March – April ABF=400 cfs	May – Sept. ABF=50 cfs	Increase	Decrease
WESTVILLE DAM (DA = 99.5 sq.mi.)	FLOOD CONTROL	1,600	50 cfs			200 cfs/hr to 900 cfs then 100 cfs/hr	500 cfs/hr
	NORMAL OPERATION	NA	100 cfs or inflow whichever is less	400 cfs or inflow whichever is less	50 cfs or inflow whichever is less	Weir controls normal pool; however, if needed, incremental gate changes to closely mimic run- of-river flow conditions	
	MAINTENANCE	NA				100 cfs/hr below 400 cfs and 200 cfs/hr above 400 cfs	
NOTES:							
1. When storing water to raise the pool to a target level, and inflow is less than the seasonal ABF, outflow will be equal to 70% of inflow, therefore, storing only 30% of inflow.							
2. Normal pool level: 10 ft							



**TABLE 2 – AREA CAPACITY OF WESTVILLE LAKE**

<u>Pool Stage</u> <u>(feet)</u>	<u># Acres</u> <u>Flooded</u>	<u>Pool Stage (ft)</u>
<b>10</b>	<b>23</b>	<b>Permanent Pool</b>
11	27	
12	31	
13	35	
14	39	
15	44	
16	48	
<b>17</b>	<b>52</b>	<b>Recreation Area closes</b>
18	56	
19	60	
20	64	
21	67	
22	69	
23	71	
24	73	
25	76	
26	79	
27	82	
28	85	
29	88	
30	91	
<b>31</b>	<b>94</b>	
32	97	
33	99	
34	101	
35	104	
36	108	
<b>36.5</b>	<b>106</b>	<b>On average, an event will produce this pool stage every two years. There is a 50% chance it will occur every year.</b>
37	116	
38	127	
39	141	
40	160	
41	184	
42	212	
43	244	
<b>44</b>	<b>286</b>	<b>On average, an event will produce this pool stage every five years There is a 20% chance it will occur every year.</b>
45	326	
46	375	
47	425	
<b>48</b>	<b>470</b>	<b>On average, an event will produce this pool stage every 10 years. There is a 10% chance it will occur every year.</b>
49	520	
50	568	
<b>51</b>	<b>620</b>	<b>On average, an event will produce this pool stage every 20 years. There is a 5% chance it will occur every year.</b>
52	670	
53	720	
54	770	
55	819	
56	866	
57	913	
<b>58</b>	<b>990</b>	<b>On average, an event will produce this pool stage every 50 years. SPILLWAY CREST: There is a 2% chance it will occur every year. On average, an event will produce this pool stage every 100 years. There is a 1% chance it will occur every year.</b>
<b>61</b>	<b>1100</b>	<b>On average, an event will produce this pool stage every 500 years.</b>

**TABLE 3 - ANNUAL PEAK POOL LEVELS**

<b>WESTVILLE LAKE PEAK POOL LEVELS</b> <b>WATER-YEARS (OCTOBER 1-SEPTEMBER 30)</b> <b>(1962 - PRESENT)</b>				
<b>Date</b>	<b>Annual Peak</b>		<b>Storage Utilized</b>	
	<b>Pool Level (feet)</b>	<b>Inches</b>	<b>Acre-Feet</b>	<b>Percent</b>
1962 Apr 04	13.5	0.1	106	1
1963 Mar 29	11.5	0	40	0
1964 Jan 28	21.7	0.3	549	5
1964 Nov 30	27.5	0.6	980	9
1966 Mar 27	16.5	0.1	235	2
1967 May 29	34.5	1	1,640	15
1968 Mar 22	49	3.1	5,240	48
1969 Apr 27	37.5	1.2	1,985	18
1970 Feb 06	44.5	2	3,395	31
1971 Apr 06	19.9	0.3	429	4
1972 Mar 24	46	2.3	3,900	35
1973 Feb 05	40.9	1.5	2,493	23
1973 Dec 23	41	1.5	2,510	23
1975 Mar 20	17.2	0.2	271	2
1976 Jan 29	31.1	0.8	1,300	12
1977 Mar 15	33.6	0.9	1,550	14
1978 Jan 27	38.7	1.3	2,148	20
1979 Jan 27	44.8	2	3,494	32
1980 Mar 23	39.1	1.3	2,205	20
1981 Feb 27	41.3	1.5	2,570	23
1982 Jun 07	47.3	2.6	4,435	40
1983 Apr 26	40.7	1.4	2,459	22
1984 Jun 05	50.5	3.6	6,085	55
1985 Sep 29	19.2	0.2	387	4
1986 Mar 17	38.8	1.3	2,162	20
1987 Apr 09	49.2	3.1	5,350	49

**TABLE 3 – ANNUAL PEAK POOL LEVELS (CONTINUED)**

Date	Annual Peak		Storage Utilized	
	Pool Level (feet)	Inches	Acre-Feet	Percent
1988 Mar 28	20.1	0.3	442	4
1989 Aug 15	33.8	0.9	1,570	14
1989 Oct 22	37.7	1.2	2,011	18
1991 Aug 23	29.7	0.7	1,173	11
1991 Nov 25	19.4	0.2	399	4
1993 Apr 02	43.9	1.9	3,202	29
1994 Mar 11	20.6	0.3	474	4
1995 Mar 11	15	0.1	165	2
1996 Jan 29	36.3	1.1	1,836	17
1996 Oct 21	23.4	0.4	666	6
1998 Mar 11	38.5	1.2	2,120	19
1999 Jan 25	19.8	0.2	425	4
2000 Apr 23	21	0.3	498	5
2001 Mar 31	28.3	0.6	1,047	10
2002 May 15	15.7	0.1	195	2
2002 Dec 23	19.8	0.2	421	4
2004 Apr 15	25.7	0.5	838	8
2005 Apr 04	33.1	0.9	1,490	14
2005 Oct 16	46.5	2.4	4,100	37
2007 Apr 17	42.3	1.6	2,782	25
2008 Mar 09	36.2	1.1	1,824	16
2008 Nov 19	30.5	0.7	1,249	12
2010 Mar 16	13.3	0.1	100	1
2011 Aug 31	40	1.4	2,345	21
2011 Dec 08	14.2	0.1	131	1
2013 Jun 08	17.5	0.2	287	2
2014 Mar 31	25.7	0.5	834	8
2015 Apr 05	16.8	0.1	248	2
2016 Feb 25	16.8	0.1	248	2
2017 Apr 07	17.3	0.2	274	2
2018 Apr 17	19.6	0.2	410	4
2019 Jan 25	23.1	0.4	647	6
2019 Dec 15	15.2	0.1	174	2

**TABLE 4 – WILDLIFE SPECIES PRESENT IN MASSACHUSETTS**  
**\* NOTES THREATENED/ENDANGERED SPECIES**

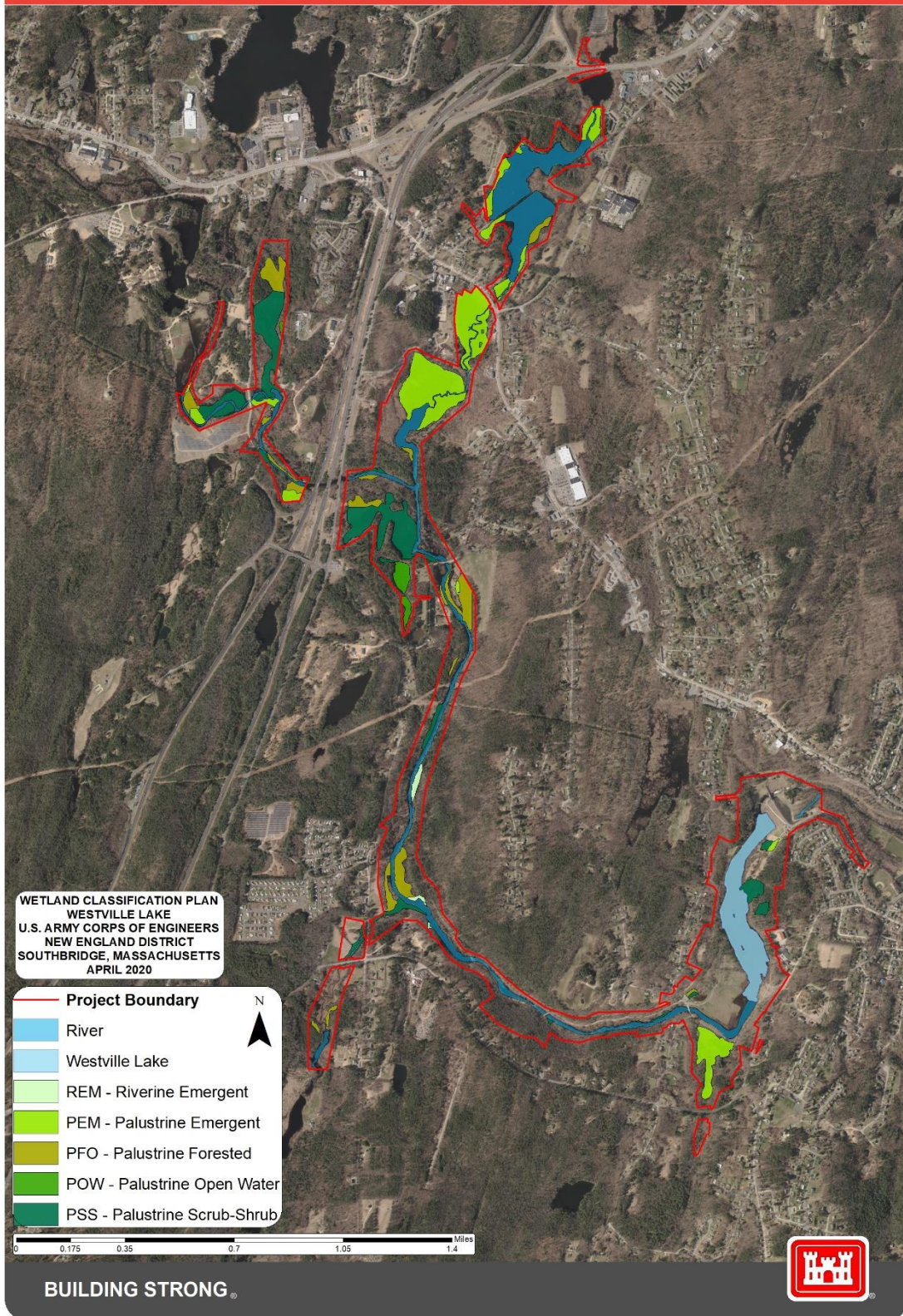
**WILDLIFE SPECIES**

<b><u>Common Name</u></b>	<b><u>Scientific Name</u></b>	<b><u>Common Name</u></b>	<b><u>Scientific Name</u></b>
Virginia Opossum	<i>Didelphis virginiana</i>	Northern River Otter	<i>Lontra canadensis</i>
Masked Shrew	<i>Sorex cinereus</i>	Striped Skunk	<i>Mephitis mephitis</i>
Smoky Shrew	<i>Sorex fumeus</i>	Bobcat	<i>Lynx rufus</i>
Common Water Shrew*	<i>Sorex palustris</i>	White-tailed Deer	<i>Odocoileus virginianus</i>
Northern Short-tailed Shrew	<i>Blarina brevicauda</i>	Moose	<i>Alces alces</i>
Hairy-tailed Mole	<i>Parascalops breweri</i>	Blue-spotted Salamander*	<i>Ambystoma laterale</i>
Star-nosed Mole	<i>Condylura cristata</i>	Spotted Salamander	<i>Ambystoma maculatum</i>
Little Brown Bat	<i>Myotis lucifugus</i>	Marbled Salamander*	<i>Ambystoma opacum</i>
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Eastern Newt	<i>Notophthalmus viridescens</i>
Eastern Red Bat	<i>Lasiurus borealis</i>	N. Dusky Salamander	<i>Desmognathus fuscus</i>
Hoary Bat	<i>Lasiurus cinereus</i>	E. Red-backed Salamander	<i>Plethodon cinereus</i>
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	Four-toed Salamander*	<i>Hemidactylium scutatum</i>
Eastern Pipistrelle	<i>Pipistrellus subflavus</i>	Spring Salamander	<i>Gyrinophilus porphyriticus</i>
Big Brown Bat	<i>Eptesicus fuscus</i>	Two-lined Salamander	<i>Eurycea bislineata</i>
Eastern Cottontail	<i>Sylvilagus floridanus</i>	Eastern Spadefoot*	<i>Scaphiopus holbrookii</i>
New England Cottontail	<i>Sylvilagus transitionalis</i>	American Toad	<i>Bufo americanus</i>
Snowshoe Hare	<i>Lepus americanus</i>	Fowler's Toad	<i>Bufo fowleri</i>
Eastern Chipmunk	<i>Tamias striatus</i>	Spring Peeper	<i>Pseudacris crucifer</i>
Woodchuck	<i>Marmota monax</i>	Gray Treefrog	<i>Hyla versicolor</i>
Eastern Gray Squirrel	<i>Sciurus carolinensis</i>	American Bullfrog	<i>Rana catesbeiana</i>
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	Green Frog	<i>Rana clamitans</i>
Northern Flying Squirrel	<i>Glaucomys sabrinus</i>	Pickerel Frog	<i>Rana palustris</i>
Southern Flying Squirrel	<i>Glaucomys volans</i>	Northern Leopard Frog	<i>Rana pipiens</i>
American Beaver	<i>Castor canadensis</i>	Wood Frog	<i>Rana sylvatica</i>
White-footed Mouse	<i>Peromyscus leucopus</i>	Snapping Turtle	<i>Chelydra serpentina</i>
Deer Mouse	<i>Peromyscus maniculatus</i>	Eastern musk turtle	<i>Sternotherus odoratus</i>
Southern Red-backed Vole	<i>Clethrionomys gapperi</i>	Painted Turtle	<i>Chrysemys picta</i>
Meadow Vole	<i>Microtus pennsylvanicus</i>	Spotted Turtle	<i>Clemmys guttata</i>
Woodland Vole	<i>Microtus pinetorum</i>	Wood Turtle*	<i>Gleptemys insculpta</i>
Common Muskrat	<i>Ondatra zibethicus</i>	Blanding's Turtle*	<i>Emydoidea blandingii</i>
Southern Bog Lemming*	<i>Synaptomys cooperi</i>	Eastern Box Turtle*	<i>Terrapene carolina</i>
Meadow Jumping Mouse	<i>Zapus hudsonius</i>	Eastern Wormsnake*	<i>Carphophis amoenus</i>
Woodland Jumping Mouse	<i>Napaeozapus insignis</i>	Eastern Racer	<i>Coluber constrictor</i>
Common Porcupine	<i>Erethizon dorsatum</i>	Ringnecked Snake	<i>Diadophis punctatus</i>
Coyote	<i>Canis latrans</i>	Eastern Ratsnake*	<i>Elaphe obsoleta</i>
Red Fox	<i>Vulpes vulpes</i>	Eastern Hognosed Snake	<i>Heterodon platirhinos</i>
Common Gray Fox	<i>Urocyon cinereoargenteus</i>	Milksnake	<i>Lampropeltis triangulum</i>
Black Bear	<i>Ursus americanus</i>	Northern Watersnake	<i>Nerodia sipedon</i>
Common Raccoon	<i>Procyon lotor</i>	Smooth Greensnake	<i>Opheodrys vernalis</i>
Fisher	<i>Martes pennanti</i>	DeKay's Brownsnake	<i>Storeria dekayi</i>
Ermine	<i>Mustela erminea</i>	Red-bellied Snake	<i>Storeria occipitomaculata</i>
Long-tailed Weasel	<i>Mustela frenata</i>	Eastern Ribbonsnake	<i>Thamnophis sauritus</i>
American Mink	<i>Mustela vison</i>	Common Gartersnake	<i>Thamnophis sirtalis</i>

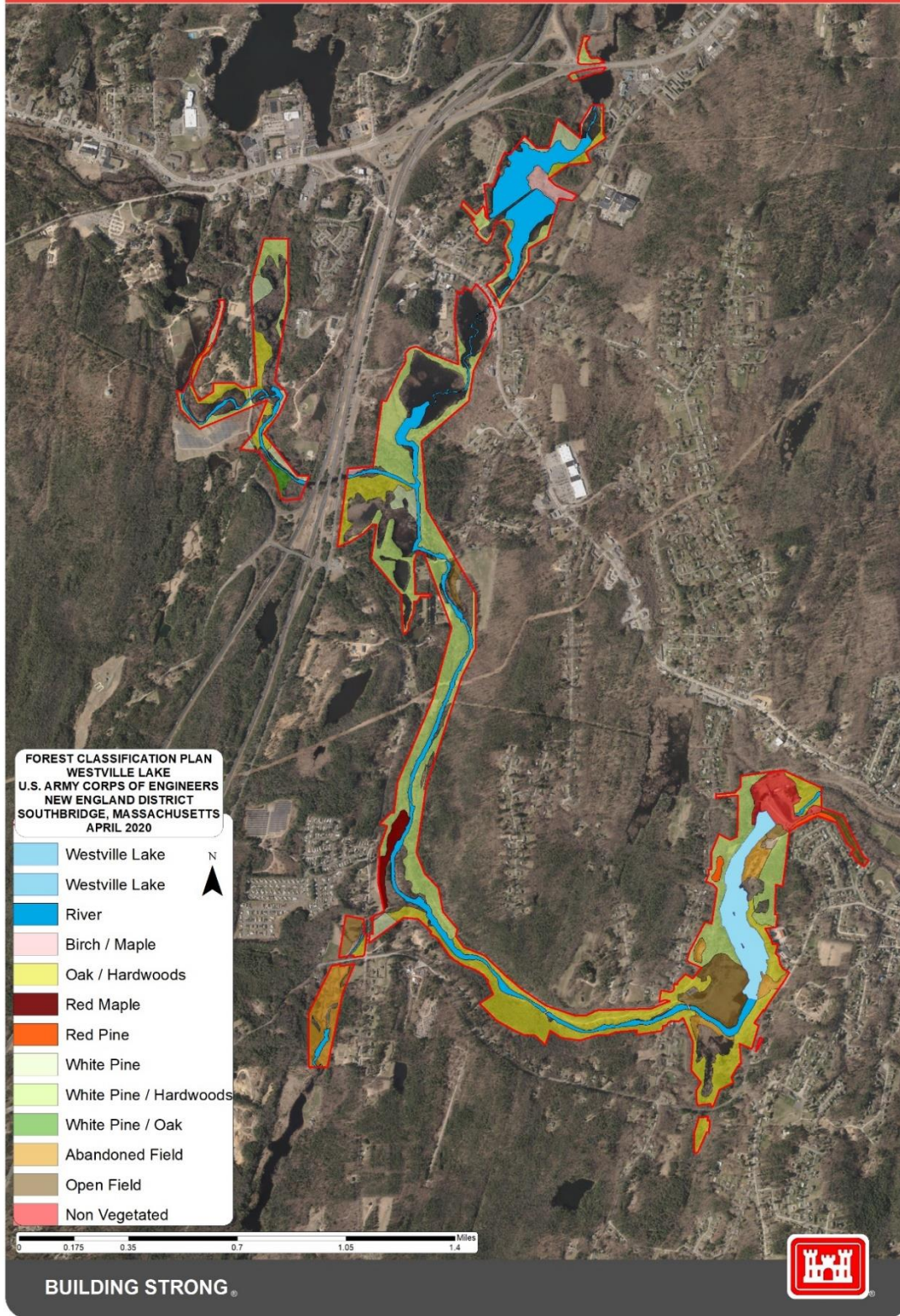
## APPENDIX B – NATURAL RESOURCE MAPS

DRAFT

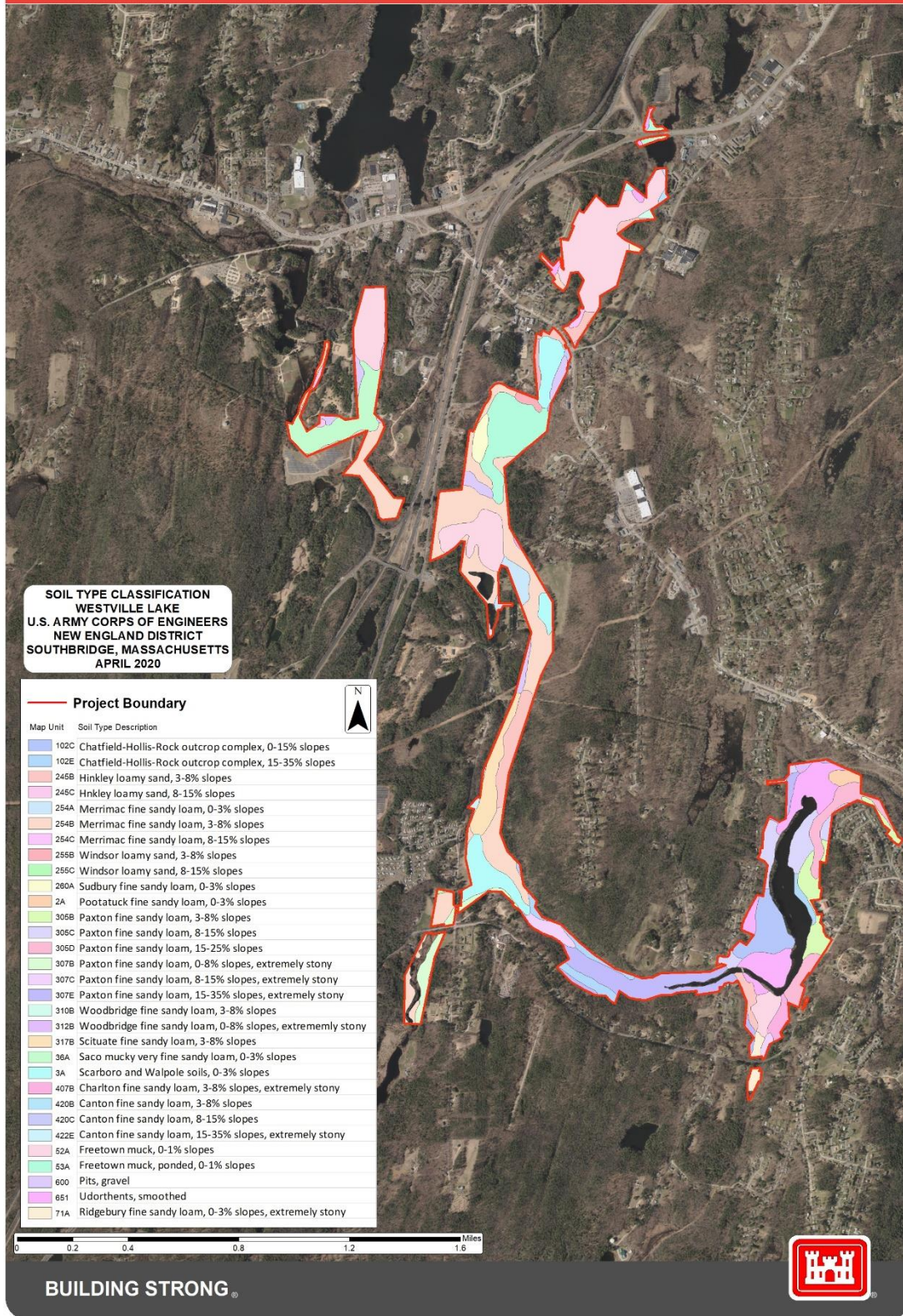




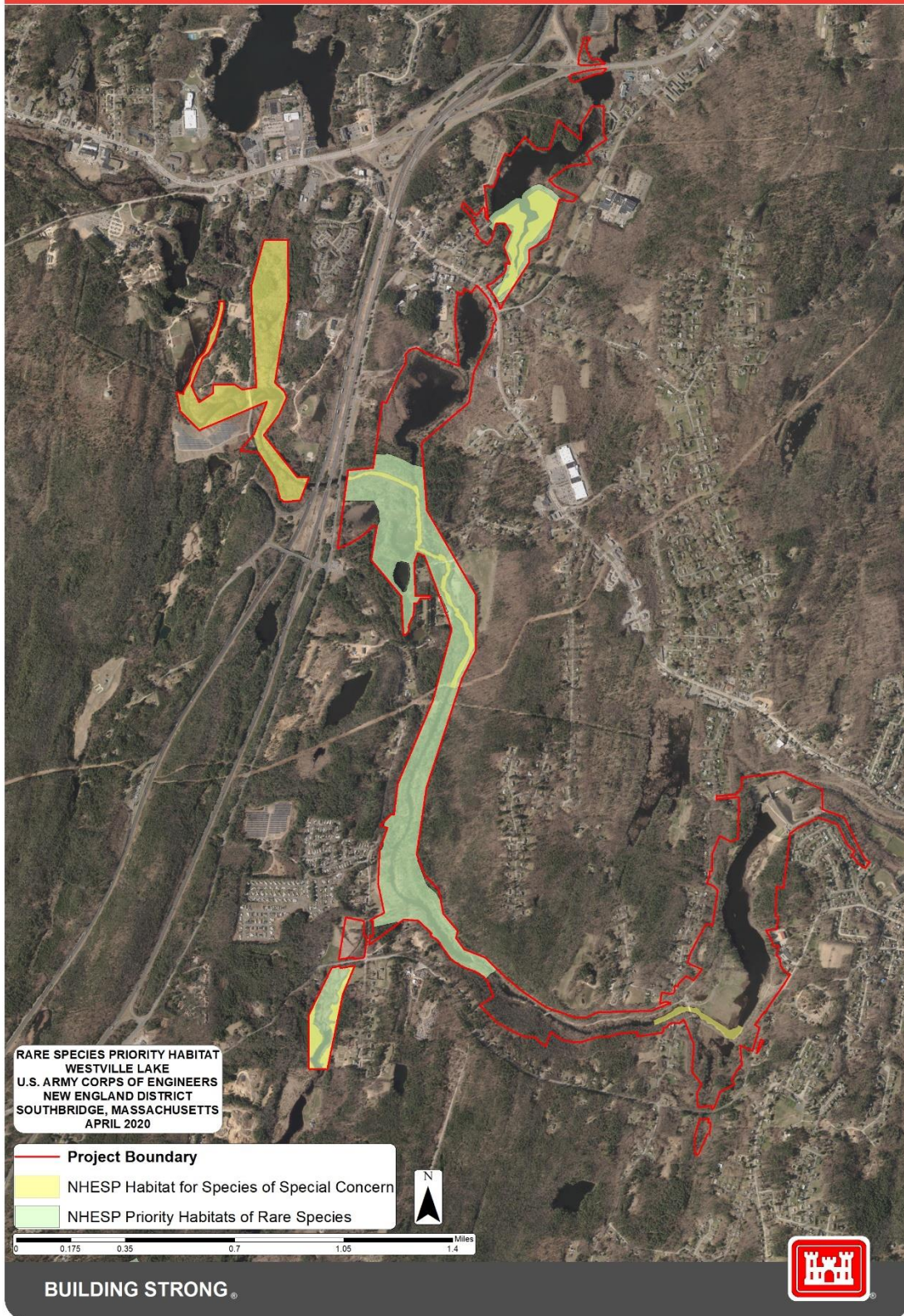




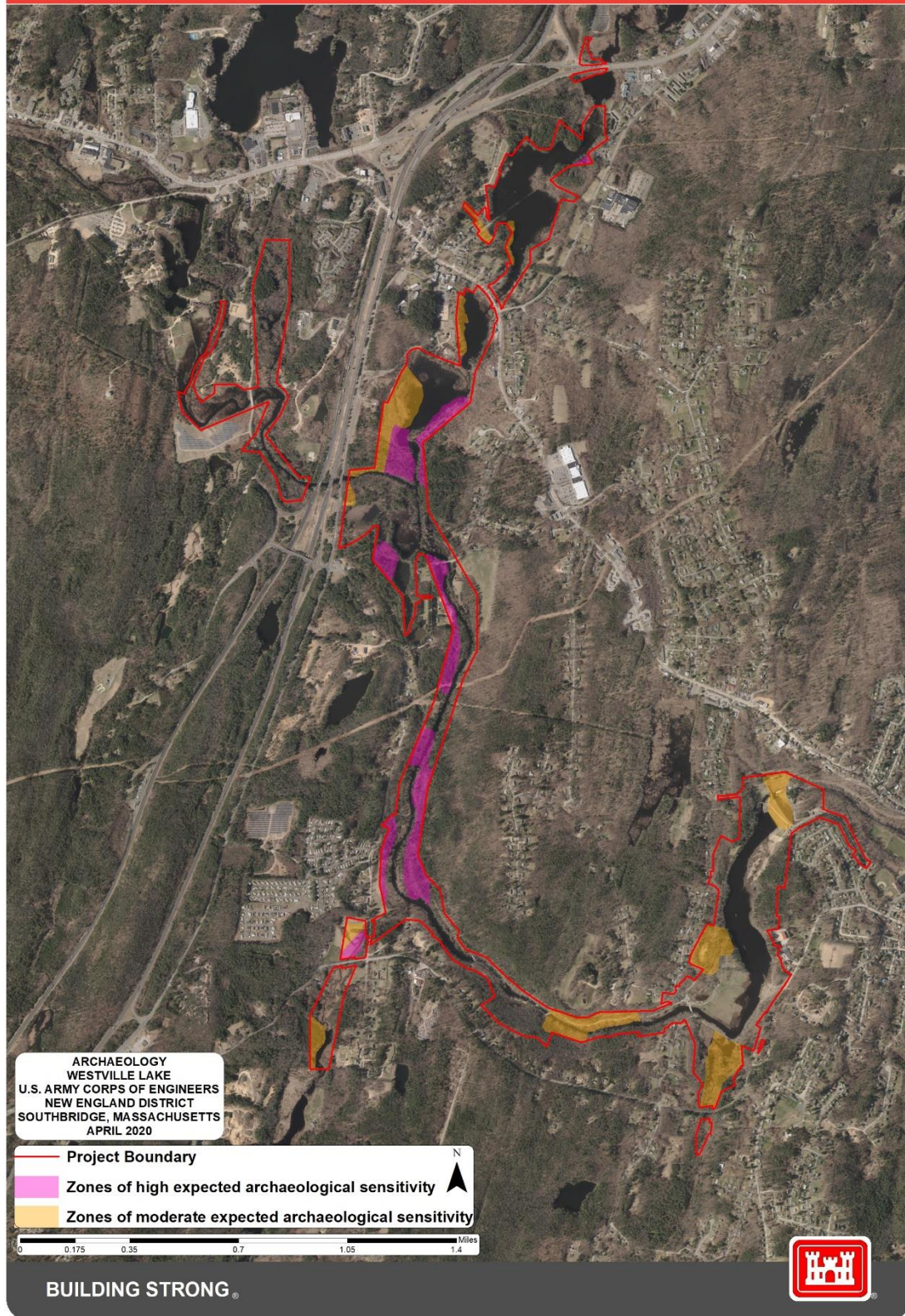






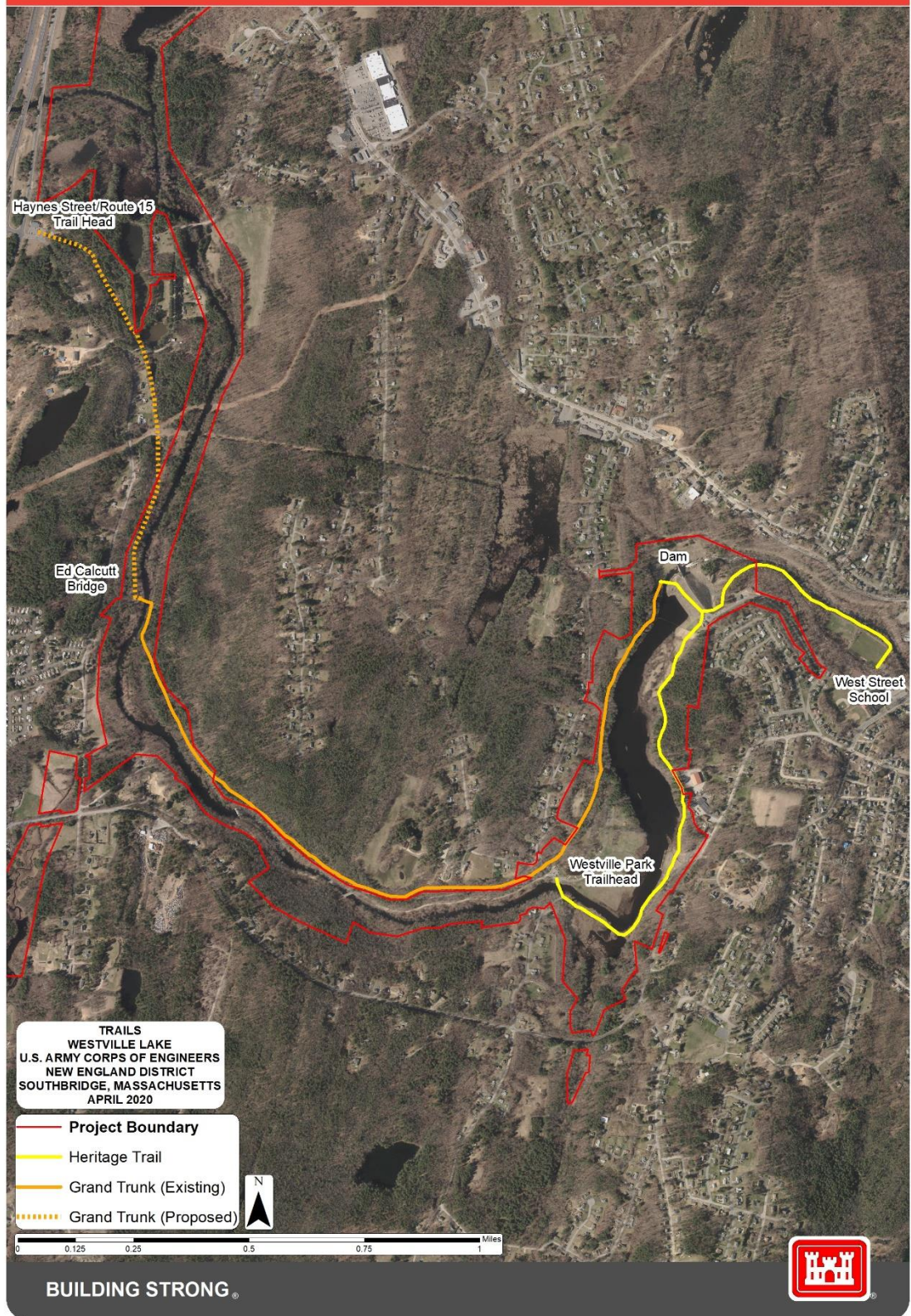






## **APPENDIX C – PARK AND RECREATION MAPS**



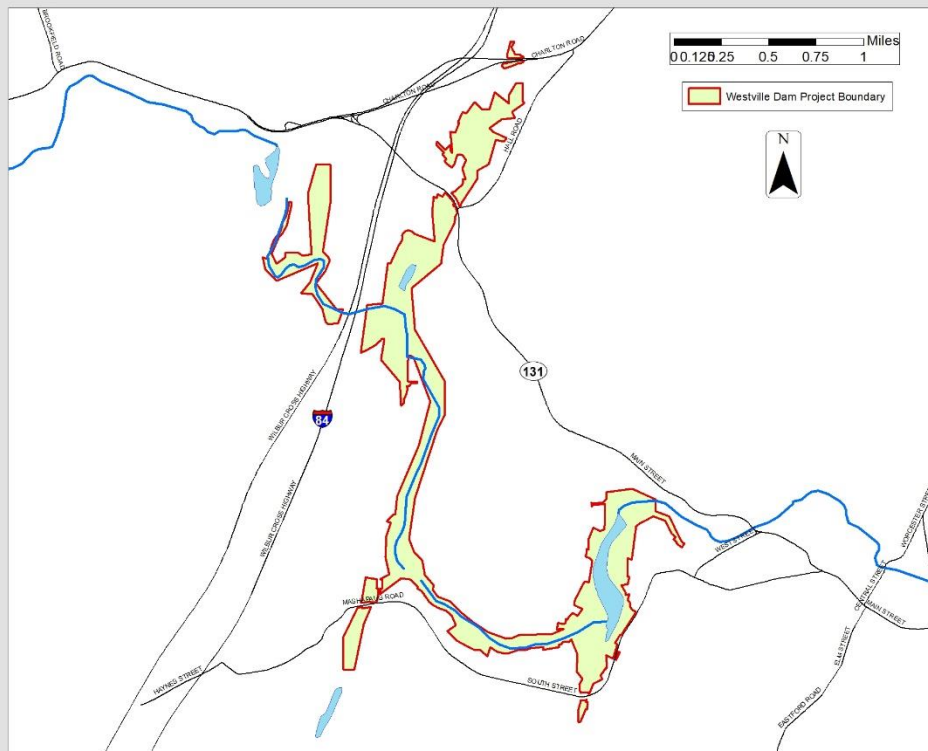
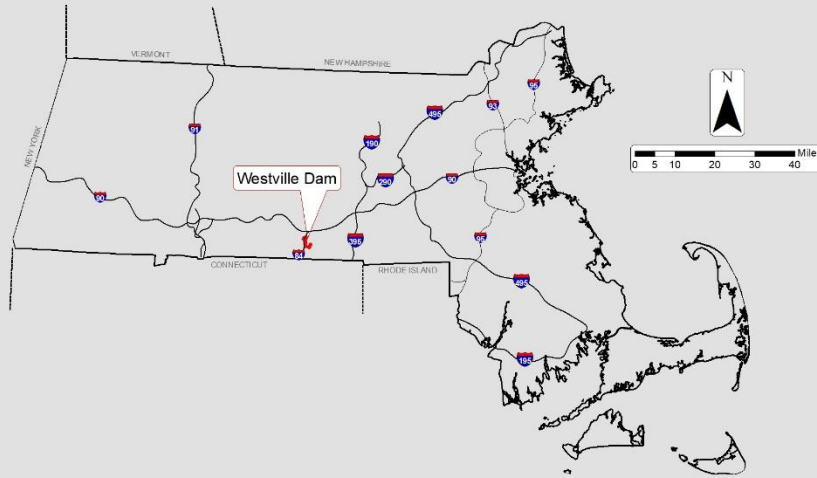






## APPENDIX D – PROJECT MAPS

DRAFT

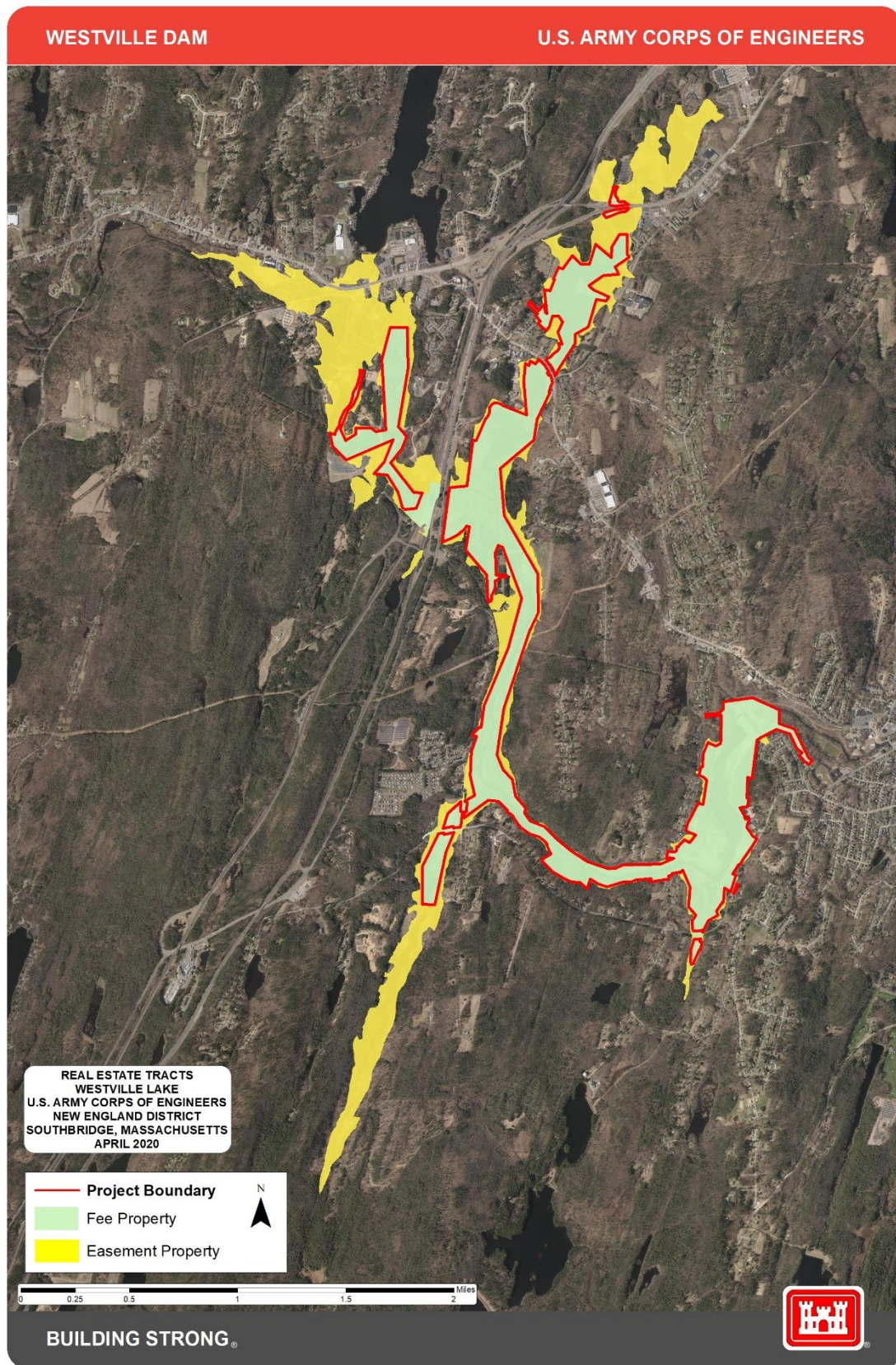


LOCUS MAP  
WESTVILLE LAKE  
U.S. ARMY CORPS OF ENGINEERS  
NEW ENGLAND DISTRICT  
SOUTHBRIDGE, MASSACHUSETTS  
APRIL 2020

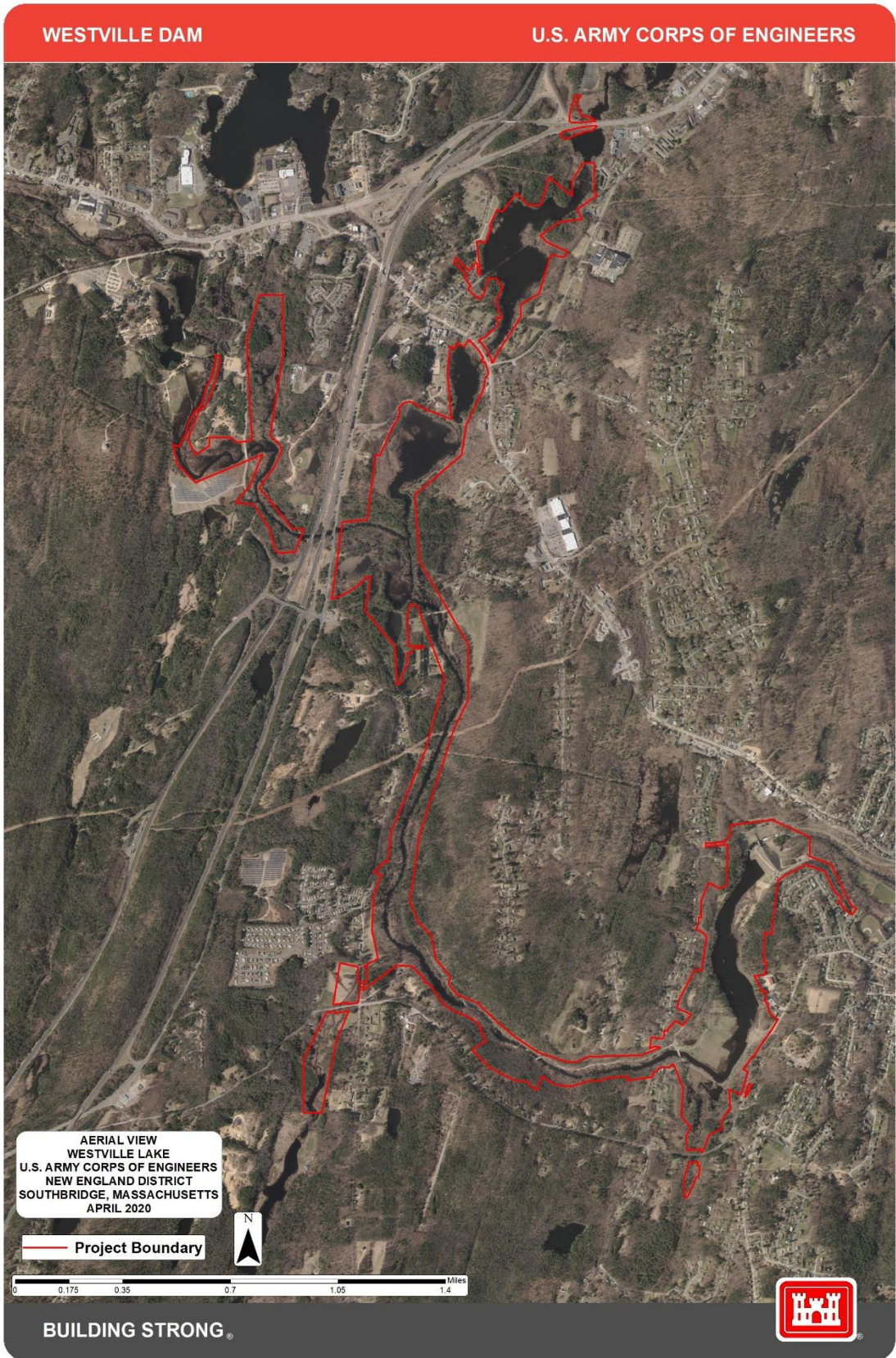
BUILDING STRONG®



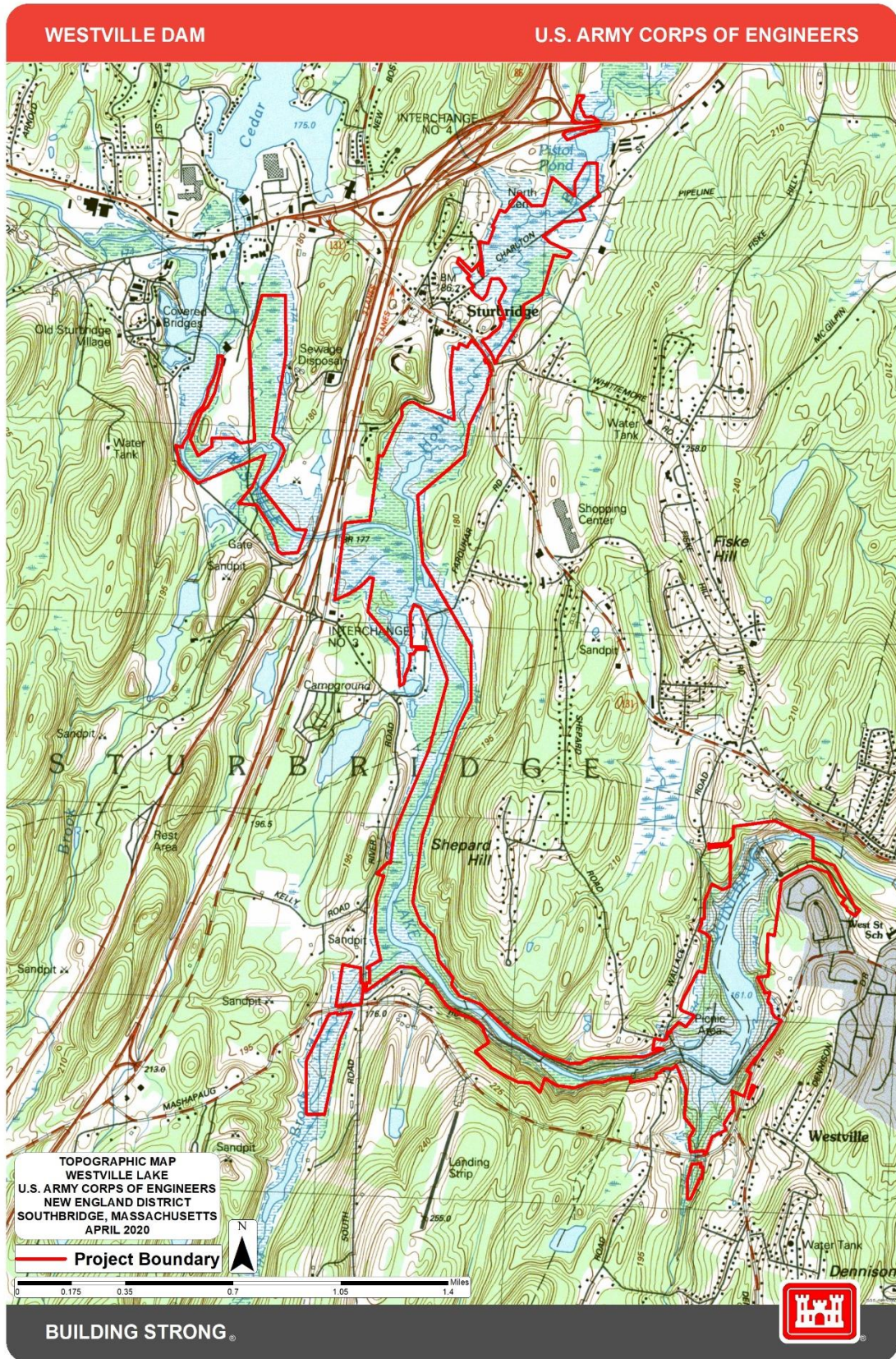








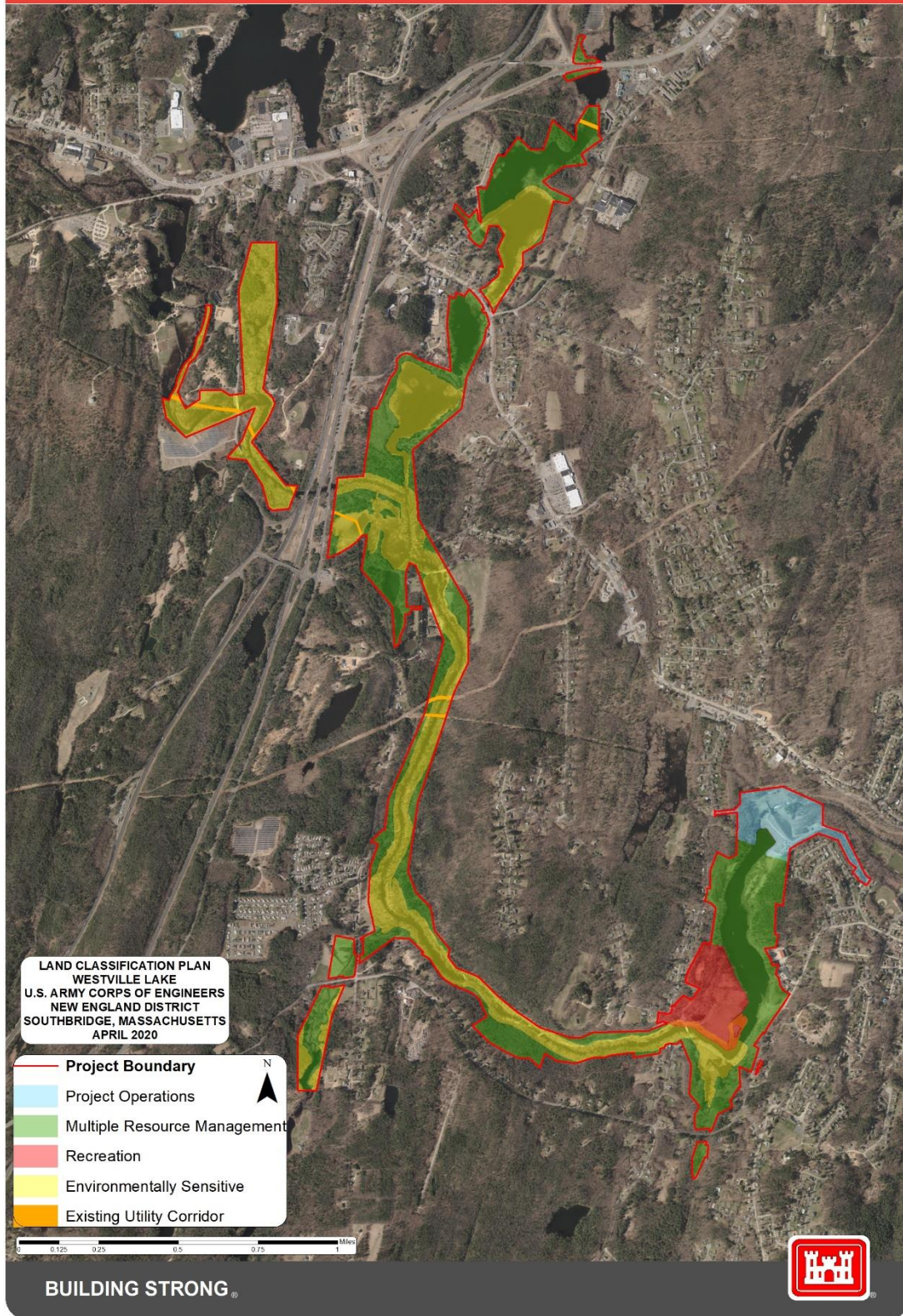




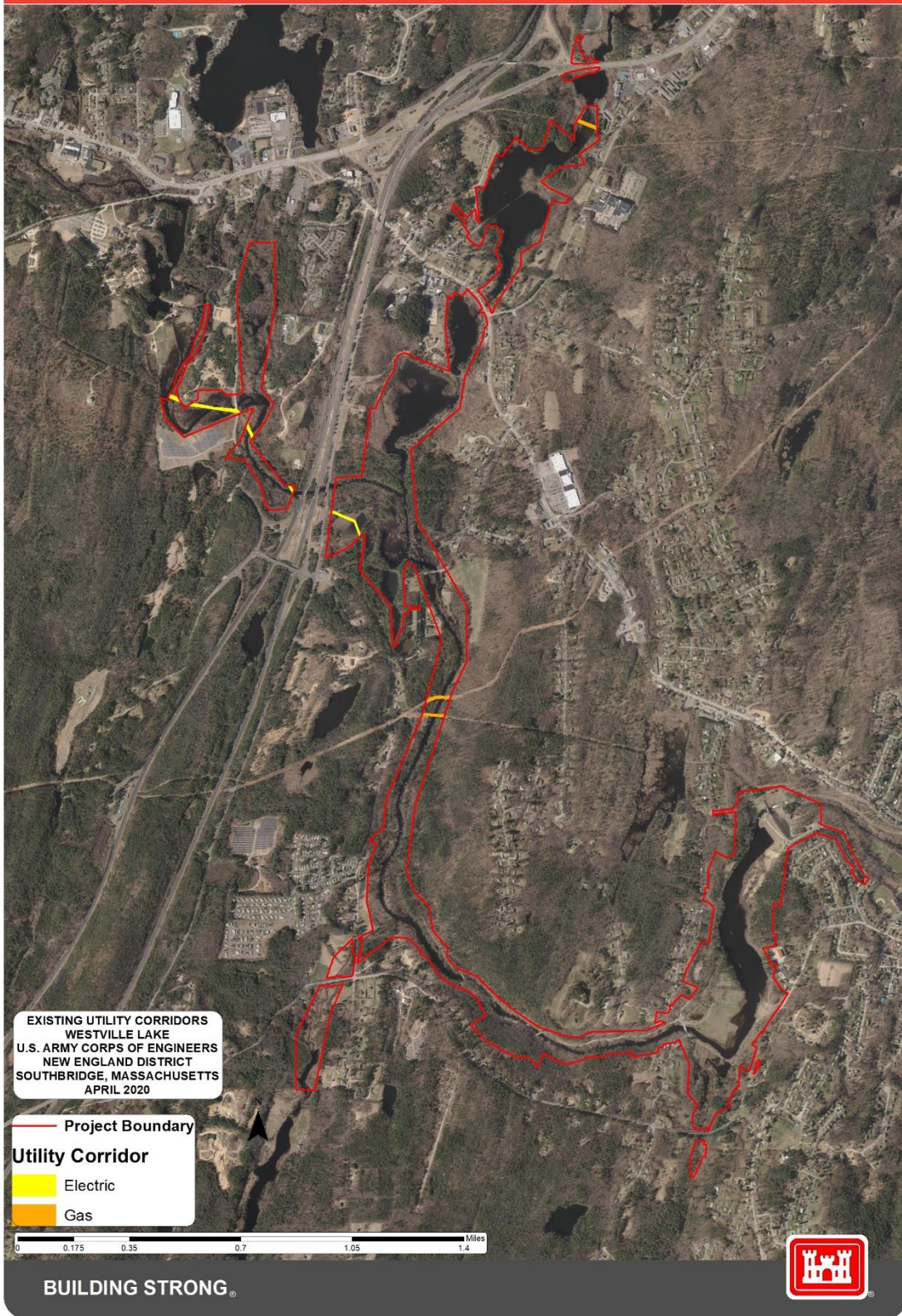




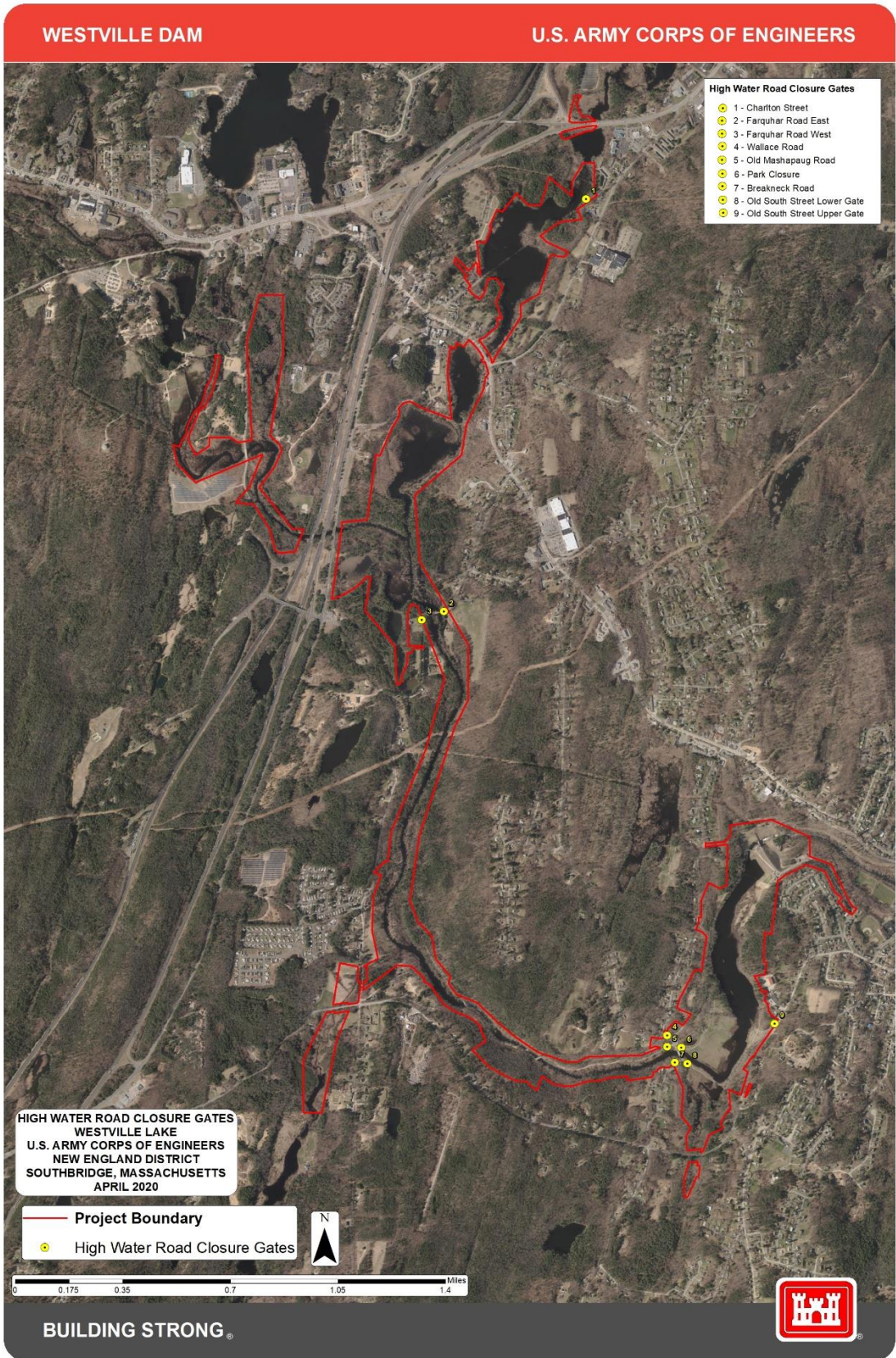












## APPENDIX E – PUBLIC COMMENTS